
Biofeed®
FERTILIZERS
AGRI-CROP
MANUAL
ACTI-CELL TECHNOLOGY®
ACT
POWERED BY PLANTS

Contents

Build the Biological Health of Your Soil!

Soil scientists agree that an active aerobic microbial population is critical to any viable soil system. Living microbes help form life-giving humus from decaying plant and animal residues. The natural approach is feeding the soil with a supply of natural based nutrients that can provide long-term nutrition. Biofeed® products provide biologically-based, environmentally safe and non-toxic ingredients that are scientifically formulated to condition and detoxify soils while they stimulate the aerobic microbial activity that turns the soil environment into a living system of beneficial organisms.

MICROBES: The Living Part of Soil

Biofeed® combines its own dynamic blend of synergistic components combined in our **Acti-Cell Technology® (ACT)** such as nano-particles, amino acids and carbon molecules, enzymes, biostimulants, gibberellic acid, auxins and cytokinin that support not only plant growth but also support the growth of microbes that live in the soil.

Biofeed® also delivers vitamins, minerals and complexed nutrients that stimulate billions of living soil microbes into action. These tiny life forms consume organic matters and transform them into humus while they stimulate the production of complex sugars called “polysaccarides” which coat and bridge minute soil particles that creates soft crumb-like soil structure- an ideal condition for plant and root growth, health and vigor.

At the same time, chelation (key-lay-shun) occurs. Biofeed’s® enzymatically active ACT® dissolves complex nutrient compounds previously tied up in the soil and converts them to a soluble form that plants can easily absorb.

Through this same action, sodium is neutralized thus allowing it to be leached out of the soil.

When applying Biofeed® products, beneficial microbes are stimulated and rapidly multiply. As a result, these organisms digest organic and nutrient residues and release them for plant up-take. The residual matter that remains is called humus. This portion of the decomposed organic compounds may remain in the soil for many years and are vital to healthy soil structure.

The BIOFEED® difference…. AEROBIC Biological Activity

Biofeed® products release elemental oxygen into the soil through the action of our unique enzyme system (HDH) which splits the water molecule. This action provides much needed oxygen to support the growth of beneficial aerobic microbes- already present in the soil. The release of free oxygen also creates an environment in which unwanted anaerobic microbes- which cause disease cannot thrive.

Just one teaspoon of “Good” or healthy soil contains up to 14 billion bacteria, 560 million actinomycetes, and 28 million fungi in a single ounce of soil. Most soils are less than 20% of optimum populations of microbes while some soils that are tilled and chemically abused may totally lack one or the other of these organisms.

It is estimated that 60%-80% of organic matter will be biologically converted to humus which is provides a slow-release reservoir of available soil nutrients. The remainder will form highly insoluble carbon forms and carbon dioxide.

EXAMPLE: If a soil has 1% organic matter in 1-acre foot of soil and weighs 4,000,000 pounds, it will have 40,000 pounds of organic matter. If the organic matter contains 2% nitrogen, we will have the potential of 800 pounds of nitrogen being released to future crops. When we have the normally low biological activity of 20% break-down level we would only benefit from 40 pounds of this stored nitrogen per year. The average crop productivity that results from this normal rate of nitrogen release explains the need for applied nitrogen.

However, increasing soil biological activity by 15%-20% or higher can potentially increase the release of nitrogen to 40%-60% or more and potentially up to 350-450 pounds per acre per year. This holds true for the other nutrient elements tied up in soil and organic matters.

Without initiating a technically sound soil management program, beneficial soil microbes may die off and soil fertility may be lost. Microbial growth and activity is related to several factors, such as the amount and type of tillage used, water availability and quality, etc. In any event, natural soil health depends on the proper application of organic input in any given soil type.

Beneficial Activity of Soil Microbes

1. Decomposition of soil organic matter and release of bound nutrients.
2. Formation of Humus for slow release of elements.
3. Produce polysaccharides that improves physical soil structure.
4. Improved nitrogen fixation.
5. Improved plant/soil interaction and nutrient absorption.
6. Reduction of soil borne diseases and black layer.
7. Antagonistic effect against plant pathogens and nematodes

Beneficial Functions of Biofeed®

1. Improved water holding and release capacity.
2. Improved soil properties both chemical and physical.
3. Solubilize soil minerals.
4. Release of nutrients to plant roots.
5. Support of natural soil biological populations.
6. Aids micro-nutrient release to plant roots.
7. Increases buffering capacity of salts and other toxins.
8. Absorption of solar heat due to darker color.
9. Reduction of the toxicity of substances from natural and man-made sources.
10. Production of natural biostimulants that translocate through the root, stem and leaf to support healthy plant growth.

Monitoring the soils content of organic matters and from time to time analyzing the balance of the various microbial populations of your soil may be necessary when yields show signs of weakening despite application of a balanced fertilizer program. Addition of Biofeed® products will prove beneficial due to increased biological activity and subsequent nutrient release through chelation.

Tissue testing is also a sure-fire way to determine the nutrient uptake by the roots as these nutrients accumulate in the plant and leaf tissue during normal growth functions. The improper balance of nutrients in these tissues may well indicate deficient levels of nutrient release due to poor biological activity below ground.

Managing Different Soil Types.

CLAY- The First Factor

One common component of many soils is clay. Soils that are composed of high levels of clay tend to hold nutrients due to the high porosity of each individual particle as well as the exchange capacity (EC) of the active site on the clay platelet. Clay particles have a unique structure which holds a higher than normal electrical and magnetic charge into which a wide spectrum of metals ions and cations are attached and exchanged via acidic (H+) and hydroxyl (OH-) displacement that is often dispersed into the soil. During the breakdown of organic matter and the subsequent generation of Carbon Dioxide, carbonic acid is formed in the soil solution in addition the oxidation of sulfides and sulfuric acid compounds which may liberate hydrogen (H+) ions and thereby cause a disruption in the metal/clay matrix. This reaction is normal and may in part satisfy the basic micronutrient needs of the plants growing therein.

More importantly, in predominantly clay soils, the release and uptake of plant nutrients occurs from the presence of organic acids which affect the release of these nutrients through chelation reactions. Chelation by complex organic molecules results in the rapid uptake of nutrients according to the Soil Science Society of America.

SAND- The Second Factor

The component of soils with the least water and nutrient holding capacity is sand. Primarily made of silica with some mineral deposition in or below the surface, sandy soil often presents the greatest challenge due to the lack of porosity of the individual particles. This may be remedied to a measurable degree by including manures, compost, tillage of green crops and crop residue. Addition of Biofeed® soil conditioning products will greatly enhance the formation of humus through biological decomposition of organic matter and lead to improved soil fertility in high sand conditions. Addition of clay, silt and organic matter may also be required to successfully farm in soils predominantly composed of sand.

SILT- The Third Factor

Silt is a sedimentary soil or rock material consisting of very fine particles which are intermediate in size between sand and clay. Silt may occur as a soil or as suspended sediment in a surface water body. Soils primarily composed of silt tend to be more fertile as in the Nile River Valley due to the abrasive nature of these soils in which minerals tend to physically break away due to the ready movement of silt during periods of flooding. Nutrient rich silt soils also consist of a combination of nutrients and organic matters that usually carry of a variety of soil and aquatic bacteria from mountainous runoff that lend support to fertile biological activity. Yet in short periods of drought, this soil type easily becomes dried out similar to sandy soils as these do not generally retain water as well as clay-rich soils.

In order to understand your particular soil type, review the following soil identification chart. This will provide a base-line to understand the processes involved in developing an effective soil and fertilizer management program.

Identification of Soil Types

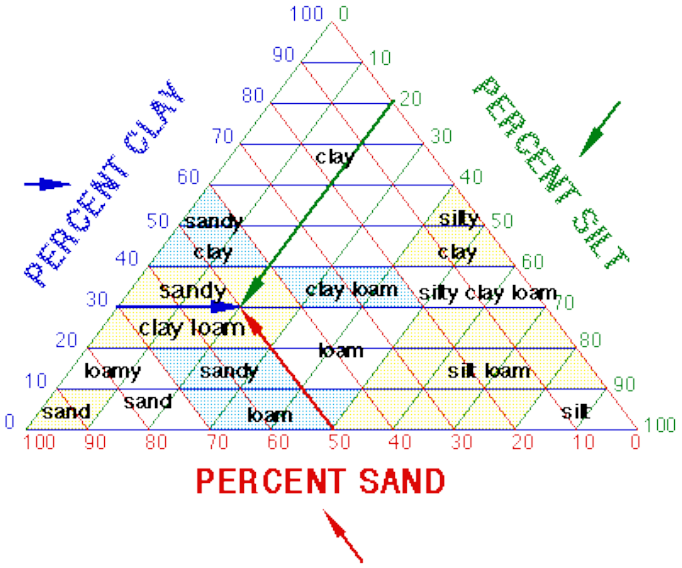


Figure- 1. Courtesy of the American Soil Society

Soil identification in classifications depending on the percentage of clay, sand and silt.

ORGANIC MATTER- THE FOURTH FACTOR

While it is true that soils vary from one location to another, the biological pathway to natural fertility and organic management may alter only very slightly. Two key factors in managing all major soil types are (1) increasing organic matters and (2) increasing biological activity. In any event, organic matters and their percentage have a profound affect on all soil types as it has a direct influence on the degree of biological activity and subsequent nutrient release from enzyme, vitamin and organic acid formation and functionality.

BIOLOGICAL ACTIVITY- THE FIFTH FACTOR

Biofeed® products build healthier soil biological systems as these products provide a super-concentrate of essential elements that energize the living systems in your soil.

Biofeed® Products are liquid formulations that contain highly concentrated organic and biochemical compounds consisting of our exclusive Acti-Cell Technology® (ACT) along with complexed nutrients, phycobiliproteins, enzymes and co-enzymes that are formulated to energize the very biology that support and build good soil. These concentrated additives stimulate the biological generation of polysaccharides and anthocyanins which are multifunctional as antioxidants and organic complexes that readily coat soil particles and chelate both macro and micronutrients. These natural sugar-polymers feed and nutritionally support biological activity and greatly contribute to humus formation to improve soil structure, and nutrient and water holding capacity, to help balance clay, silt and sandy soil conditions.

Biofeed® products are dynamically concentrated and stabilized for extended storage following manufacture and during distribution. Due to the concentration, the products should be diluted with water before application. Dilution prior to application should be made according to recommendations supplied by qualified Biofeed field reps to ensure uniform coverage and eliminate leaf-burn when applied using conventional agricultural field application equipment.

How Biofeed® Releases Oxygen and Hydrogen Into Both Soil and Water Systems

More recently, scientists have discovered that certain chemotrophic bacteria have the capacity to enzymatically derive oxygen from water and release it into the immediate environment where it is used by neighboring aerobic bacteria. This new scientific discovery opens the way for better understanding of the principles behind oxygen/hydrogen generation and the process behind the liberation of hydrogen and oxygen from the H2O molecule for direct use in environmental or applications. It is further appreciated that while these reactions are quite minute, the impact of these discoveries may well change the direction of today's chemical revolution.

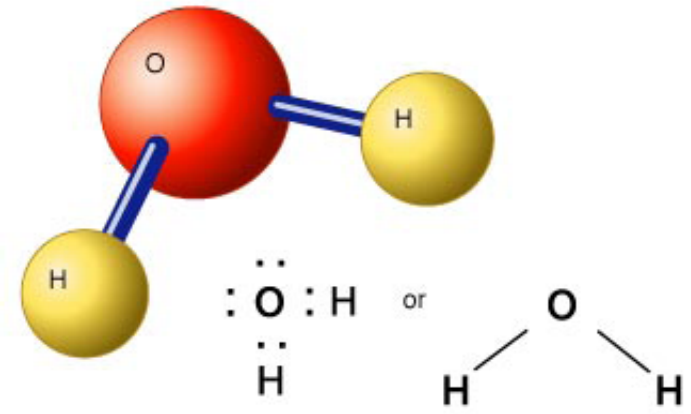
The researchers at Biofeed Solutions, Inc. understands the potential applications and benefits of these dynamic biochemical processes and therefore have developed a series of biological and biochemical processes to naturally generate these dynamic HDH enzyme systems and these may one day be utilized to replace several commonly used carbon based fuel sources and chemicals which harm our environment.

This enzyme system called H2O Dehydrogenase (HDH) consists of a combination of ATP, DNA, Co-enzymes, Proteins, Proteic acids, Cytochrome Reductase and other Intracellular Extracts. These combine with and react with the water molecule to disrupt the double bonds that cause the formation of water through the removal of electrons that make up the double bonds between two hydrogen atoms and one oxygen atom. When water molecules (H2O) split, hydrogen ions are also released. For every water molecule that is split, two hydrogen atoms and one oxygen atom is released.

The potential net yield of this reaction has not yet been fully realized on a commercial scale. Additional research is required to develop this system into a viable energy source that may one day drive our vehicles, power our homes and our economy. It is said that one gallon of water contains more energy than 10,000 gallons of gasoline.

This understanding explains how the addition of a very small quantity of Biofeed® products can affect such a dynamic change by buffering soil pH and increasing aeration in water, soil and complete remediation of polluted sites.

Some call it "Rocket-Science". We just call it Biofeed®.



Breaking the bonds that hold water together is a vital key in BIOFEEDS® soil and water management program.

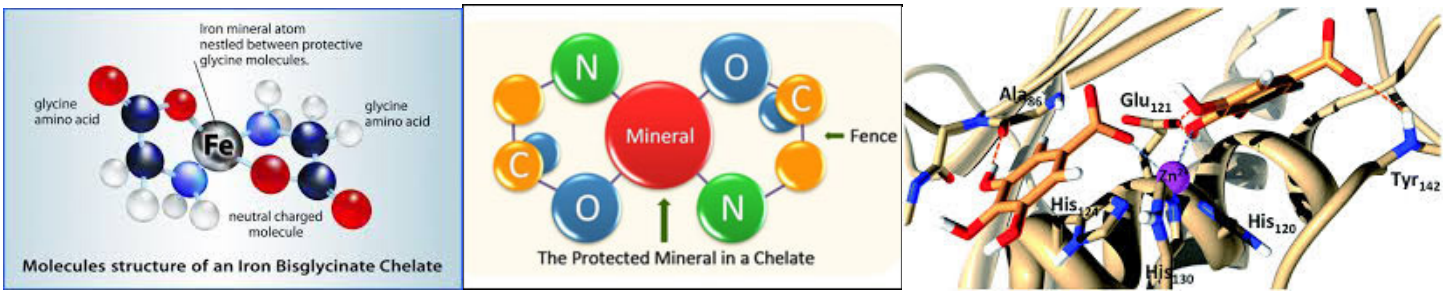
Chelating Nutrients & Soil Minerals

The word CHELATION, (pronounced “Key-lay-shun”) is derived from the Greek word CHELE’; which means “CLAW”. One chemical definition is; “To firmly bind a metallic ion with a synthetic or organic ligand, or ring-structure”. The resulting ring structure holds and protects the metal or mineral from entering into unwanted or undesirable chemical and or biological reactions. Chelated nutrients remain “free” in the environment.

Biofeed Solutions, Inc. uses its naturally produced Acti-Cell Technology® (ACT) to carry out chelation reactions with a variety of minerals and mineral complexes to improve plant uptake and/or buffer unwanted micronutrient or trace mineral assimilation to remediate toxic soils and sites.

Plants respond best to organically chelated macro and micro-nutrients. These can be a chelated solution with micronutrients applied to or derived from the soil media. Also, chelated nutrients can be applied to the leaf for foliar uptake. The manufacture and application of chelated nutrients is a global industry that greatly improves crop response and farm productivity.

Plants cannot carry out respiration, grow or produce when they lack certain nutrients. The reason dramatic results are seen from blending nutrient mixes with Biofeed® products with ACT® is largely due to powerful chelation or nutrient solubilizing reactions and the leaf-friendly compounds found in the products.



Biofeed® Acti-Cell Technology® (ACT) Chelate Models that display the complex nature and ability to form a stable chelate with a variety of metals.

The following mineral absorption barriers should be considered:

1. Trace minerals in the soil, when in the form of inorganic mineral salts, may be insoluble. When they exist in nature as oxide, such as iron oxide, they remain unavailable and cannot function as plant nutrients.
2. The wrong balance between two very important minerals may occur when a nutrient blend is formulated. A common example would be the reaction that is produced when iron and phosphate are blended. Insoluble iron phosphate occurs when iron and phosphoric acid are tank-blended and the subsequent reaction forms iron phosphate which becomes insoluble and thus available to the plant unless they are chelated or protected so as to prevent tie-up.
3. An inorganic salt may be very soluble as is the case with zinc sulfate. Following application to calcareous soils, Zinc is easily tied-up with phosphorus in the soil. However, Biofeed® provides micronutrient stabilization through chelation in the root-zone to enhance root up-take of the applied zinc.
4. The soil may be either too alkaline or acidic causing low availability of nutrients required by growing plants.
5. Inorganic trace minerals may precipitate following application to alkaline soil and be absorbed onto clay particles and or silicates in the soil.
6. Physical factors such as drought, excessive compaction leading to poor oxygen movement into the soil, land leveling may also interfere with mineral release and up-take as this may contribute to sub-soil compaction.

As we consider the above barriers to nutrient absorption, the reader can further appreciate the beneficial effect of using Biofeed® products with ACT® to overcome the challenging dynamics of farming and soil management.

Source: DEL Research

Balancing the pH of Soil

Balancing your soil's pH or Hydrogen to Hydroxyl equilibrium may be required if it is either too acidic or too alkaline.

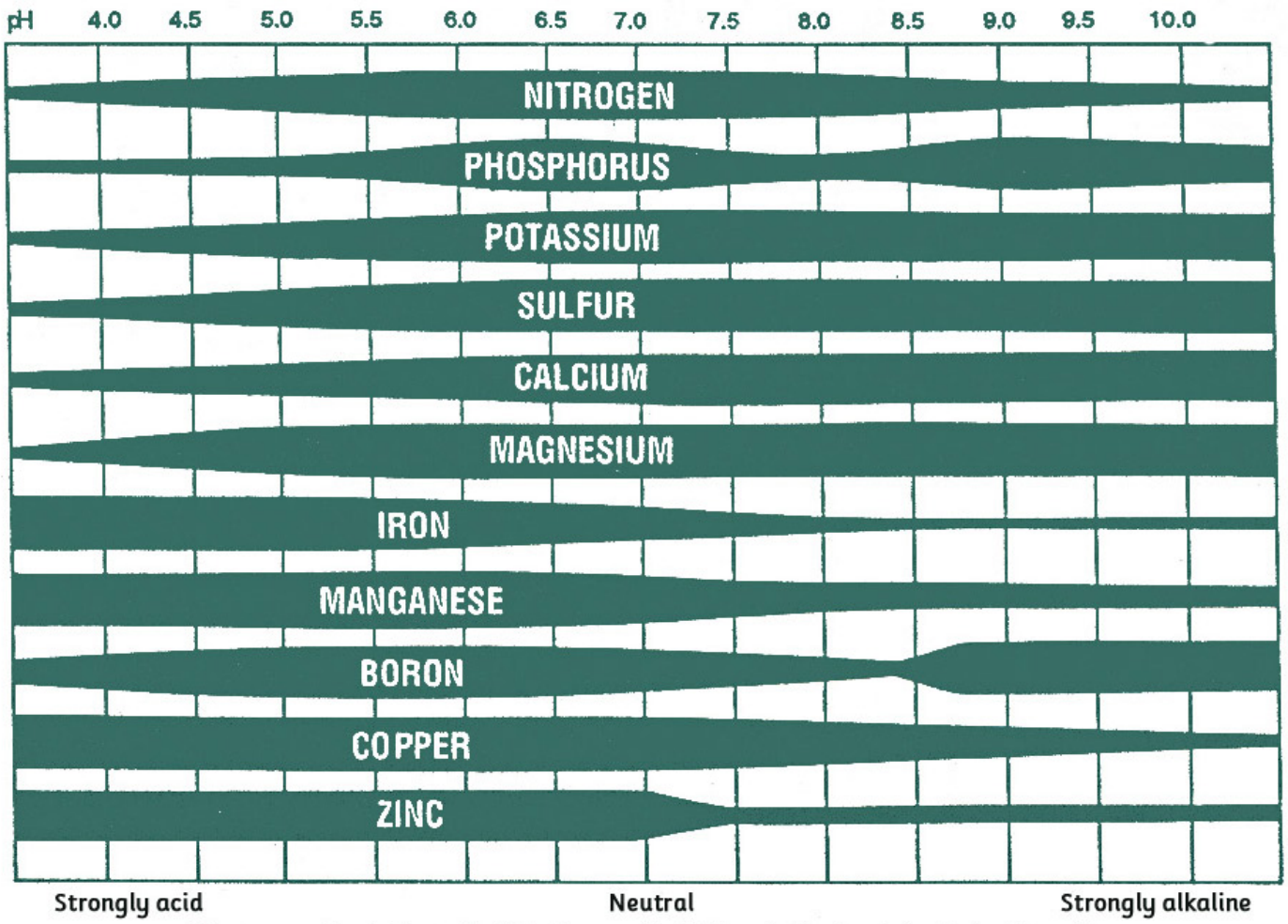
If soil pH is too far above or below a pH of -7- which is neutral, then you may have low yields due to reduced nutrient release from the soil into the roots of your crops. While they may be growing in nutrient-rich ground they could be starving due to poor solubility of soil minerals. Under alkaline conditions, Biofeed® products release hydrogen (H+) in addition to oxygen from the water molecule and this will gradually following a series of regular treatments, adjust the soil pH downward, closer to 7.5-8.0 pH over the course of 1-4 growing seasons. If soil pH is strongly alkaline in the range of 7.5 pH or higher, additional off-season soil treatments along with deep watering or using additional products from Biofeed® may be required to break-out and leach the alkaline salts to reduce pH to a tolerable range.

If the pH is too low, then application of Agricultural lime or Dolomitic lime may be required. Lime is a soil additive made from pulverized limestone or chalk. The primary active component is calcium carbonate. Additional chemicals vary depending on the mineral source and may include calcium oxide, magnesium oxide and magnesium carbonate.

Effects on Soil:

- it increases the pH of acidic soil (the higher the pH the less acidic the soil)
- it provides a source of calcium for plants
- it permits improved water penetration for acidic soils

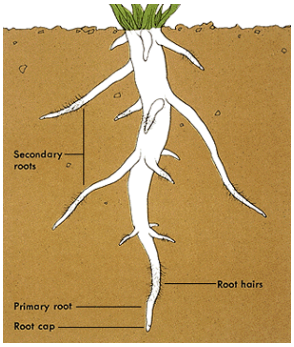
Table 2. Effects of soil acidity/alkalinity on plant nutrient availability



The general relation of pH to the availability of plant nutrients in the soil: the thicker the bar, the more available the nutrient.

Improving Nutrient Absorption

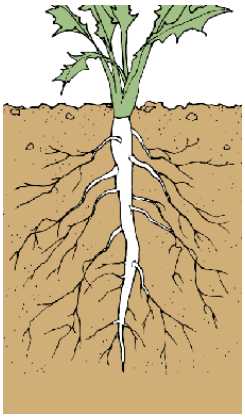
Roots are the principal organ for the absorption of water and dissolved nutrients in virtually all plant-life. The root also anchors the plant body to the soil and stores reserve nutrients and starches. Roots usually grow beneath the surface of the soil and extend from the base of the stem. Some roots, however, grow above the ground from branches or leaves. These roots either penetrate the soil or become attached to another plant or object as they grow.



Roots anchor a plant in the soil, absorb water and minerals and store food.

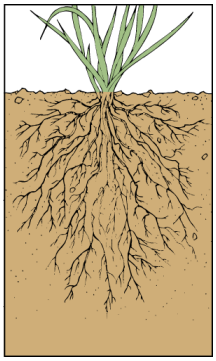
Types of Roots

The single root that develops from the seed is called the primary root. In some species, the primary root thickens and becomes the principal root of the plant. This kind of root system (found, for example, in carrot plants) is known as a taproot system. Tuberous roots bear clusters of tubers (thickened storage organs) that contain buds or eyes from which new plants grow. This type of root system is found in the dahlia and ranunculus buttercup.



Taproot systems have a primary root that thickens and becomes the principal root of the plant.

If the primary root branches, the branching roots are called secondary roots. This kind of root system, usually found in turf grasses and grain crops such as wheat or rye, is known as a fibrous root system.



Fibrous turf grass root systems hold topsoil in place and prevent soil erosion while they provide maximum soil contact for nutrient absorption.

Roots growing aboveground from parts of the plant other than the stem base are called adventitious roots. There are two kinds of adventitious roots prop roots and aerial roots. Prop roots, and many aerial roots, penetrate the soil. For example, prop roots of corn grow from upper parts of the stem down to the soil, and the aerial roots of poison ivy grow from horizontal branches down to the soil. Some aerial roots do not penetrate the soil but become attached to other plants or objects instead. Plants with such roots are called epiphytes. Many orchids are epiphytes.

Root tissues are classified in the order in which they are found. As shown in the illustration of a Root, a root has three layers:

The **Epidermis** is the outermost layer of the root. It is composed of epidermal tissue and is one cell-layer thick. The epidermis serves as the protective covering of the root.

The **Cortex** is primarily a storage area for food and water. It is composed of storage tissues, air spaces, and the endodermis. The endodermis is the inner boundary of the cortex and is one cell-layer thick. The cells of this layer prevent water from moving into the cortex from the next layer.

Vascular Area is the innermost area of the root contains vascular tissue, which is made up of xylem cells and phloem cells. Xylem cells transport dissolved minerals and water, and sometimes stored food, into the stem. Phloem cells carry food made in photosynthesis from the stem into the root. The pericycle is a single layer of cells surrounding the vascular tissue. Branch roots develop from cells of the pericycle.

Regions of Development

The root is composed of several regions that give rise to the specialized cells needed in the formation of plant tissues. These regions, unlike the layers of the root, are not distinctly separated from each other but blend from one into the next. The regions, as shown in the illustration Root Tip, are, from bottom to top:

The **Meristematic Region** is where in a growing root, rapid cell division takes place. At the bottom of this region a cup-shaped root cap covers the apex (tip) and protects the young cells from injury as they are pushed down through the soil.

The **Region of Elongation** is the region of cell growth. Here cells increase in size but are not differentiated into specific tissues. The elongating cells exert a mechanical force on the root apex and push the root tip farther down into the soil.

Root Hair Zone and Region of Maturation

The **Root Hair Zone** is the area where root hairs grow. A root hair is a tubular outgrowth of an epidermal cell. Root hairs provide the plant with additional surface area for the absorption of water and minerals from the soil. Within the root hair zone is the region of maturation, where the cells differentiate. During differentiation the cells become specialized to perform various functions.

The Region of Mature Plant Tissues is where epidermal, cortical, and vascular tissues form.

Uses of Roots

Many plants are economically important root crops. Taproots, such as the beet, carrot, parsnip, radish, turnip, sweet potato, salsify, and cassava (used in making tapioca), are used as food. Many fibrous and tap roots are used for flavorings or in making medicines. Goldenseal, jalap, licorice, and mandrake roots are used in flavoring medicines. Common food flavorings are obtained from the roots of such plants as ginger, horseradish, angelica, and sarsaparilla. Some of the roots used in making drugs are colchicum and ipecac. Fibrous root systems are also agriculturally important because they hold topsoil in place and prevent soil erosion.

Source: DEL Research

Foliar Feeding of Crops

Over 100 years ago, early agricultural researchers discovered that sprinkling a solution of nutrients and minerals onto the leaves of a variety of plants caused measurable increases of growth and an improvement in the color, health and production of crops. It was later realized that natural foliar feeding has been going on all along, as mineral-rich dust particles settle on the leaf, morning dew dissolves and carries this solution into the leaf in a liquid form. Ongoing research eventually led to the development of what exists today as the foliar fertilizer industry. This exciting technology is used daily throughout the world to boost crop production to levels never before thought possible. Foliar feeding provides numerous benefits that are quite obvious to experienced growers and is considered to be essential to making agriculture profitable. Foliar products can be applied to virtually all crops from fruits to nuts, from lettuce to potatoes. All plant life can greatly benefit from foliar feeding!

Crop response from foliar feeding depends upon several factors including the biochemical functionality of applied nutrients, carrier quality, salt content, method and timing of application, humidity and soil moisture, soil salt levels, air temperature, and current nutritional status of the crop or plant. The primary benefits of foliar feeding include immediate nutrient translocation and correction of deficiency with the goal of increasing crop production.

A VITAL NEXT STEP

Foliar application of Biofeed® foliar products with our exclusive Acti-Cell Technology® (ACT) that contains biochemically bound elements combined with bio-stimulants for immediate uptake through the leaf. This over-the-top technique, when used in an ongoing foliar-feeding program produces bloom and fruit setting hormones within the plant that keep the plant in a fertility mode and yields and profitability are dramatically improved.

Upon application of Biofeed with ACT, nutrient elements are rapidly absorbed through the leaf cuticle and stomata the epidermal barrier and finally the cell membrane that encloses the living portion of the plant leaf itself. Once inside the plant leaf, these organic components provide dynamic metabolic energy that serves as a whole-food which strengthens cell growth and increases plant sugar (Brix) production by improving photosynthetic capacity.

It is this very process that has been overlooked during the chemical fertilizer revolution.

Biofeed products include foliar applied products that supply a specialized complex of major and/or micronutrients, nano-particles, amino acids, plant extracts and derivatives, phenolic acids, carboxylic acids, natural surfactants, enzymes, vitamins and proteins. These combine to enhance the nutritional cycles of plant cells and improve nutrient mobility to and from the leaf and root system. This process stimulates the photosynthetic pathway which is the very mechanism wherein the plant absorbs sunlight and converts it to useable energy and sugar production. This process is greatly improved when specific bio-elements are applied directly to the leaf. This results in a higher level of energy production and translocation of photosynthates through the plant. The plant-sugars and other phytonutrients are in part delivered downward to the roots and exuded through the root-cap. These rhizome exudates serve as a substrate for soil microbial activity in the root zone which has a dynamic effect on root development and nutrient solubility and absorption from the soil. This results in healthier and deeper tap-root development.

When combined with soil applications of Biofeed® soil management products, roots are better able to extract soil minerals due to increased chelation and nutrient solubility reactions leading to increased profitability for the grower.

Biofeed® foliar products are highly concentrated liquid formulations that should be diluted with water before application. Recommended dilution should be strictly followed as this will ensure uniform coverage and eliminate the potential for leaf-burn when applied using conventional low-volume agricultural application equipment. Spray or foliar applications will be most effective when done early in the morning after sunrise or late in the evening before sunset. Air temperatures of 60-95 degrees Fahrenheit for foliar uptake are ideal.

Profitable and Sustainable Farming with Biofeed®

Improving crop production is the goal of every farmer. In fact, agricultural crop production is the source of most of our food and many of the products we buy and use every day. In the crop or plant management process on any farm, the grower faces decisions that affect the outcome of many months of hard work and a great deal of expense each year. Therefore, Biofeed Solutions, Inc. and its' partners have joined forces to promote the use of these products to increase crop production above the "norm" with no harmful residues that accumulate and suppress soil fertility and nutrient release. Biofeed® products do just the opposite; they improve the growing environment and thereby increase productivity.

Biofeed Solutions, Inc. uses its naturally produced Acti-Cell Technology® (ACT) to carry out and enhance a variety of chelation and buffering reactions to improve plant nutrient uptake and/or buffer and leach unwanted salts and to biologically remediate even minute soil toxicities that can suppress plant growth and reduce crop production.

Managing Salt Build-up

For many years, soil experts and/or scientists believed that the soil was merely a place where plants could stand up-right and have access to water and nutrients, but that has proven to not be the case. Salt-affected land is increasing each year because of improper irrigation practices resulting from this mentality. Selecting crops that tolerate soil salinity and yield well in salt-affected soils and employing crop management practices to counter salinity, have been proposed to maintain crop productivity. Here, it is argued that neither breeding nor management will adequately counter the effects of salinity. Although both offer the potential to maintain yields for a brief period, it is inevitable that salinity will continue to increase, and crop productivity will decline. Biofeed® products allow for the establishment of crops that will maintain evapotranspiration at high salt levels year-round on salt-affected land due to Biofeed's ability to buffer or combine with sodium thereby reducing its toxicity and allow for easier leaching below the root-zone.

Enhancing Antioxidant Production Leads to Greater Crop Production

During the process of photosynthesis in the leaves of all plant-life, a range of organic chemicals are synthesized which protect the plant from stress factors. An **antioxidant** is a molecule capable of slowing or preventing the oxidation or chemical destruction of other molecules. Oxidation is a chemical reaction that transfers electrons from a substance to an oxidizing agent. Oxidation reactions can produce free radicals, which start chain reactions that damage cells within the plant. Antioxidants terminate these chain reactions by removing free radical intermediates and inhibit other oxidation reactions by being oxidized themselves. As a result, antioxidants are usually various types of reducing agents such as vitamins or polyphenols.

Although oxidation reactions are crucial for life, they can also be damaging; hence, plants maintain complex systems of multiple types of antioxidants, such as glutathione, vitamin C, vitamin E as well as enzymes such as catalase and superoxide dismutase. Low levels of antioxidants, or inhibition of the antioxidant enzymes, cause oxidative stress and may damage or kill plant cells. Biofeed® products are University and third-party lab tested and proven to dramatically increase the production of antioxidants such as superoxide dismutase to reduce environmental stress due to excessive summer heat stress and drought conditions. (See: Biofeed® *study T-14 at www.biofeed.com) This has also resulted in reducing the loss of bolls and flowers from cotton to olives and other crops during periods of heat and drought conditions. (See: Biofeed® *study AG-1 & 2/www.bofeed.com)

Maintaining Major Nutrients

All plants require a consistent supply of nitrogen, phosphorus, and potassium along with secondary and micronutrients to produce large volumes of crops. The manufacture and application of agricultural and horticultural nutrients is a global industry that greatly improves crop/plant response and farm productivity. When using a Biofeed® fertility program on any farm it is essential to continue application of the fertilization program- and gradually, over 1-5 years reduce chemical inputs up to 30-40% per year, as time is required to build healthy soil which is the biological pathway to natural fertility.

Another major benefit of using a Biofeed® products in your Soil and Crop program is that previously applied chemicals that have become tied up, often in just 3-10 parts per million are broken down to harmless by-products as the soil fertility increases. Several University and field studies have shown that Biofeed® products stimulate the growth of soil and water organisms which hungrily attack and consume both synthetic and organic chemical residues. This process reduces the presence of toxic elements and promotes healthier plant growth. (See *studies E-1 thru E-11/www.biofeed.com) Additionally, through "chelation reactions", nutrients are readily transported through both the foliage and roots as plants absorb only soluble plant nutrients.

Ultimately, crop production is a combination of balanced nutrients, crop protection additives and proper soil care combined with good old-fashioned farming know-how. The professionals at Biofeed Solutions, Inc. are focused on delivering the best quality soil and plant fertility products available on the market today to assist the farmer/grower to produce the best results attainable.

Source: DEL Research

General Application/Blending of Biofeed® Concentrates

1. WHEN TO APPLY

   Plants readily take up or absorb Biofeed® foliar applied nutrients during the cooler parts of the early morning and evening but in most cases will refuse uptake of foliar feeding during the hottest part of the mid-day.

2. EQUIPMENT CAUTIONS

   Spray equipment and storage tanks in which other products such as pesticides, insecticides or herbicides have been stored may cause problems unless they are completely clean. The chelating properties of Biofeed® are very active and even small amounts of chemical residues will be absorbed into the products solution and can damage crops if even slight amounts are intermixed. Biofeed® can pull chemical residues that are absorbed into the surface of stainless, poly and steel tanks and deposit these chemicals on the leaves of plants and crops causing damage to sensitive crops. THOROUGHLY CLEAN ALL SPRAY, STORAGE AND TRANSPORT EQUIPMENT PRIOR TO STORAGE, BLENDING AND USE OF BIOFEED® PRODUCTS.

3. COMPATABILITY WITH NON-BIOFEED® PRODUCTS

   When mixing Biofeed® products with other chemicals always test for compatibility in a jar aside from the final mixing tank to avoid any harmful reaction. Add water if the blend thickens if the blend jells to reproduce tank mixing environment. If incompatible, apply separately.

4. MIXING BIOFEED® PRODUCTS

   Remember that ALL Biofeed® products are highly concentrated. The products must be mixed in the volume of water that is to be sprayed. You may mix Biofeed® concentrates together. If a paste forms upon mixing- add water and thoroughly mix or stir until the products go into liquid solution before spraying. Once mixed, the products will go into a revitalized complex that is safe for foliar or soil application.

5. STORAGE OF BIOFEED® PRODUCTS

   Biofeed® concentrates have a long shelf life (7 years), however, it is advisable to use them by the end of the first year after the date of purchase. Loss of any liquid through the bottle or cap may cause crystallization and minor loss of potency. If crystallization occurs the active ingredient is NOT harmed but may appear unsightly. Clean container and reconstitute with water to previous container level prior to container seal breach.

6. PREMIXED BIOFEED® PRODUCTS

   Some Biofeed® products may appear to separate in product container(s). Simple agitation, shaking or stirring and occasional addition of water may be necessary prior to final mixing and should bring the product continuity back.

7. DELAYED APPLICATION AFTER MIXING IN SPRAY TANK

   ALWAYS MIX ONLY THE AMOUNT OF PRODUCT(S) YOU INTEND TO APPLY IN ONE DAY. In the event that product is mixed not sprayed within twenty-four (24) hours after mixing or diluting with water ammonia odor may be detected DO NOT SPRAY ONTO LEAF (FOLIAR) as severe burn may occur. Contact your Biofeed® Rep as soon as possible for recommended procedures.

8. DO NOT OVER APPLY

   NEVER foliar apply more than 3- QUARTS of combined Biofeed® products at a time per acre as most plants and crops cannot absorb through the leaf more than this volume of products and diminishing return will be realized if applied beyond this rate.

   Consult your Biofeed® Rep for more information on application rates.

9. TIMING OF APPLICATIONS

   Follow ALL label directions and consult your Biofeed® rep for detailed instructions for maximum results on your crops and harvest!

10. TELL YOUR NEIGHBORS OF THE AMAZING RESULTS AND PROFITS YOU EXPERIENCED BY USING OUR AMAZING PRODUCTS!

11. Call or write us and let us know about your good, bad or amazing experience that you had with our products!

Providing A Superior Level Of Performance and Why Biofeed® is the Most Complete Bio-Fertilizer Marketed Today

Biofeed® Products are nano-particle formulations produced from biological and plant extracts through a series of proprietary processes to generate our exclusive Acti-Cell Technology® (ACT). This has resulted in the development of over 40 unique formulations that are used to improve crop production and produce award-winning turf on sports fields and golf courses. Biofeed® also produces high-tech environmental and bioremediation additives which are tested and proven to restore even the worst of soils and water systems to an active, aerobic environment.

These improved conditions created through the use of Biofeed® products are highly conducive to healthy plant growth that is more highly resistant to intrusion by unwanted pathogens.

The following list is but an example of the microbial and biochemical components found in or utilized to generate the various products;

BIOLOGICAL CULTURES

1. **Pseudomonas Strains**
2. **Bacillus Strains**
3. **Actinomycetes**
4. **Penicillium Strains**
5. **Cyanobacteria Strains**
6. **Yeast Strains**
7. **Protozoa Strains**
8. **Algae Strains**
9. **Others**

ORGANIC ACIDS / CHELATING AGENTS

1. **L-Form Aminos (ACT)**
2. **Phenolic**
3. **Polyhydroxy Acids**
4. **Citric**
5. **Isobutyric**
6. **Butyric**
7. **Proteic**
8. **Mono, Di and Tricarboxylic Acid**
9. **Proteic Acid**
10. **Xanthoproteic Acid**
11. **Buckminster Fullerene Structures**
12. **Lactic Acid**

BIOSTIMULANTS

1. **Auxins**
2. **Cytokinnins**
3. **Florigen**
4. **Gibberellins**
5. **Amino Acids (20+ amino acids)**
6. **Beta Carotenes**

ENZYMES

1. **Proteoliclytic**
2. **Cellulase**
3. **Nitrogenase**
4. **H2O Dehydrogenase**
5. **Amylase**
6. **Catalase**

COMPLEXED NUTRIENTS

1. **Nitrogen**
2. **Phosphorus**
3. **Potassium**
4. **Calcium**
5. **Magnesium**
6. **85+ complexed trace minerals**

COENZYMES (VITAMINS)

1. **Vitamin B-6**
2. **Vitamin B-12**
3. **Vitamin B-1**
4. **Vitamin C**
5. **Vitamin K**

POLYSACCHARIDES

1. **Mono, Di, and Tri-Saccharides**
2. **Glucans**

INNOVATION THAT GROWS!

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