

# Quantum Growth™

## SCIENTIFIC BREAKTHROUGH FOR PLANT GROWTH

Quantum Growth is a completely organic blend of microorganisms designed to support and enhance a plant's growth process. Quantum Growth cannot burn plants because it contains no nitrogen, phosphorous, or potassium. The photosynthetic strains of microorganisms in Quantum Growth sequester atmospheric nitrogen and carbon dioxide converting and storing them as sugars and proteins for the plant. They are 10 times more effective at producing plant food than the plants are themselves. *With Quantum Growth, plants don't have to work as hard to feed themselves and the organisms that they host and can then concentrate on increased root mass and plant growth.*

All other biological products on the market are spore formers. Spore-forming microorganisms need a healthy environment to survive. These products require water from rain or irrigation, and they use energy from the host plant to perform. If the plant or soil goes into distress, spore formers go dormant until optimal conditions return.

In comparison, the photosynthetic microorganisms in Quantum Growth actually create a healthy living environment. The microbes in Quantum Growth can manufacture water, and its photosynthetic bacteria provide energy to the plant and the organisms that it hosts. They form a symbiotic relationship with the plant and thus need the plant to live for the bacteria to survive. If the plant or soil becomes stressed, the photosynthetic bacteria in Quantum Growth will restore the plant as well as the soil back to a healthy condition. This restoration allows the plant to absorb more nutrients and water. The plants are heartier, healthier and are more resistant to pathogens and disease.

### BENEFITS OF QUANTUM GROWTH

- Grow Heartier Produce
- Reduce Fertilizer & Run-off
- Grow Lush Turf
- Increase Brix Levels
- Increase Root Mass
- 100% Organic—Safe To Humans, Animals & Plant Life
- Enrich Soil
- Will Not Burn Plants
- Reduce Supplemental Irrigation
- 3-5 Year Shelf Life

## VERY SPECIFIC RESULTS



Here's what you can expect:

Enrich your soil.

Use less fertilizer.

Reduce irrigation requirements.

Grow heartier produce.

Take more product to market.

**Oh... and bring home more green.**



*The Quantum Growth technology does not eliminate the need or usefulness of other biologicals and/or chemical agricultural management technologies. However, Quantum Growth serves to make them more effective, therefore lesser amounts are required.*

### What Quantum Growth Does

- Works to retain water naturally in the soil, so plants require less supplemental water. The microorganisms combine oxygen and hydrogen, so Quantum Growth actually builds water.
- Reduces the need for fertilizer — up to 48%!
- Promotes lush growth, more robust blooms and more vegetables.
- Produces thicker, stronger, more disease-resistant root systems.
- Launches seedlings, enabling them to acclimate quicker to their environment, giving them a head start on growth.
- Stimulates brighter, richer colors.
- Fortifies and improves plants' natural defense systems against disease and pathogens.
- Helps plants recover from damage by pathogens and environmental stress.
- Reduces fertilizer loss due to volatilization, leaching and runoff, helping to protect our waterways.

### The Reproduction Benefits

The Quantum Growth photosynthetic microorganisms double in population approximately every five minutes, while other pathogens double in population every 48 to 72 hours.

*So here's the really good part:*

Both the beneficial organisms in Quantum Growth and pathogens will flourish in the same growing conditions. So, since our guys can outgrow the bad guys, we usually prevail.

## It's important to know that Quantum Growth is 100% ORGANIC.

*It is made to pharmaceutical grade and helps balance the pH in your soil. It allows you to use up to 48% less fertilizer.*

The slang for products featuring biologicals is "bugs in a jug." Bugs in a jug are to Quantum Growth what an elementary school science project is to  $E=MC^2$ .

All other biologicals are spore-forming microorganisms. Quantum Growth is made up of vegetable microorganisms, including photosynthetic strains. With over 30 years in development, refinement, and testing; Quantum Growth is unique. It combines select strains of microorganisms. These are highly sophisticated groups — with carefully delineated and dedicated jobs to do once they are added to soil.

### *The difference between Quantum Growth and other biologicals:*

<b>Quantum Growth™</b>	<b>Spore-Forming Organisms</b>
<ul style="list-style-type: none"><li>• Cells provide energy from sugars</li></ul>	<ul style="list-style-type: none"><li>• Cells require energy from sugars</li></ul>
<ul style="list-style-type: none"><li>• Cells provide, manage, and if needed, produce water</li></ul>	<ul style="list-style-type: none"><li>• Cells require water</li></ul>
<ul style="list-style-type: none"><li>• Photosynthetic cells fix atmospheric nitrogen</li></ul>	<ul style="list-style-type: none"><li>• Cells go dormant under stress (wimps)</li></ul>

Spore-forming microorganisms need a healthy environment to survive. If plants or soil go into distress, spore-forming microorganisms go dormant until conditions are once again optimal.

Photosynthetics are vegetative and create a symbiotic relationship with the plant. To survive, they need the plants, and the plants need them. So if the soil goes into distress, the photosynthetics will do everything they can to bring the soil and the plants back to health.

## The entire world needs Quantum Growth.

*Until it catches on, let's start with you.*

Healthy soil has a high microbial content. However, excessive use of pesticides and herbicides depletes soil of the all-important microorganisms. In addition, tilling will cause a reduction in microbial content.

Plant food — real plant food — is sugar, not fertilizer. The rate at which plants convert the ingredients in fertilizer to sugar (the utilization rate) is very low. The microorganisms in Quantum Growth convert the nutrients in fertilizer into sugar ten times faster than plants can. Better yet, they share these nutrients with their host plants.

A biologically active soil is like having a fertilizer factory making 10-5-2 continually. The microorganisms in Quantum Growth take the nutrients in fertilizer and use them to build plant mass, as well as increasing their own population. When the microbes die, the fertilizer they consumed becomes readily available to the plant.

**100 lbs. of Dead Microorganisms =**  
10.0 lbs. of N / 5.0 lbs. of  $P_2O_5$  / 2.0 lbs. of  $K_2O$  /  
0.5 lbs. of Ca / 0.5 lbs. of Mg / 0.3 lbs. of S

### *Surprise added bonus: Nitrogen!*

The Earth's atmosphere is 78% nitrogen, making it the largest source of nitrogen. In plants, much of the nitrogen is used in chlorophyll molecules, which are essential for photosynthesis and growth. The photosynthetic strains of microorganisms in Quantum Growth have the nitrogenase enzymes that combines gaseous nitrogen from the atmosphere with hydrogen to produce ammonia. In plain English: It takes nitrogen out of the air and turns it into ammonia. You'll have a nitrogen factory working for you 24/7.

We have accumulated a substantial history of case studies. At your convenience, we'd like to share these with you so you can see how Quantum Growth works.

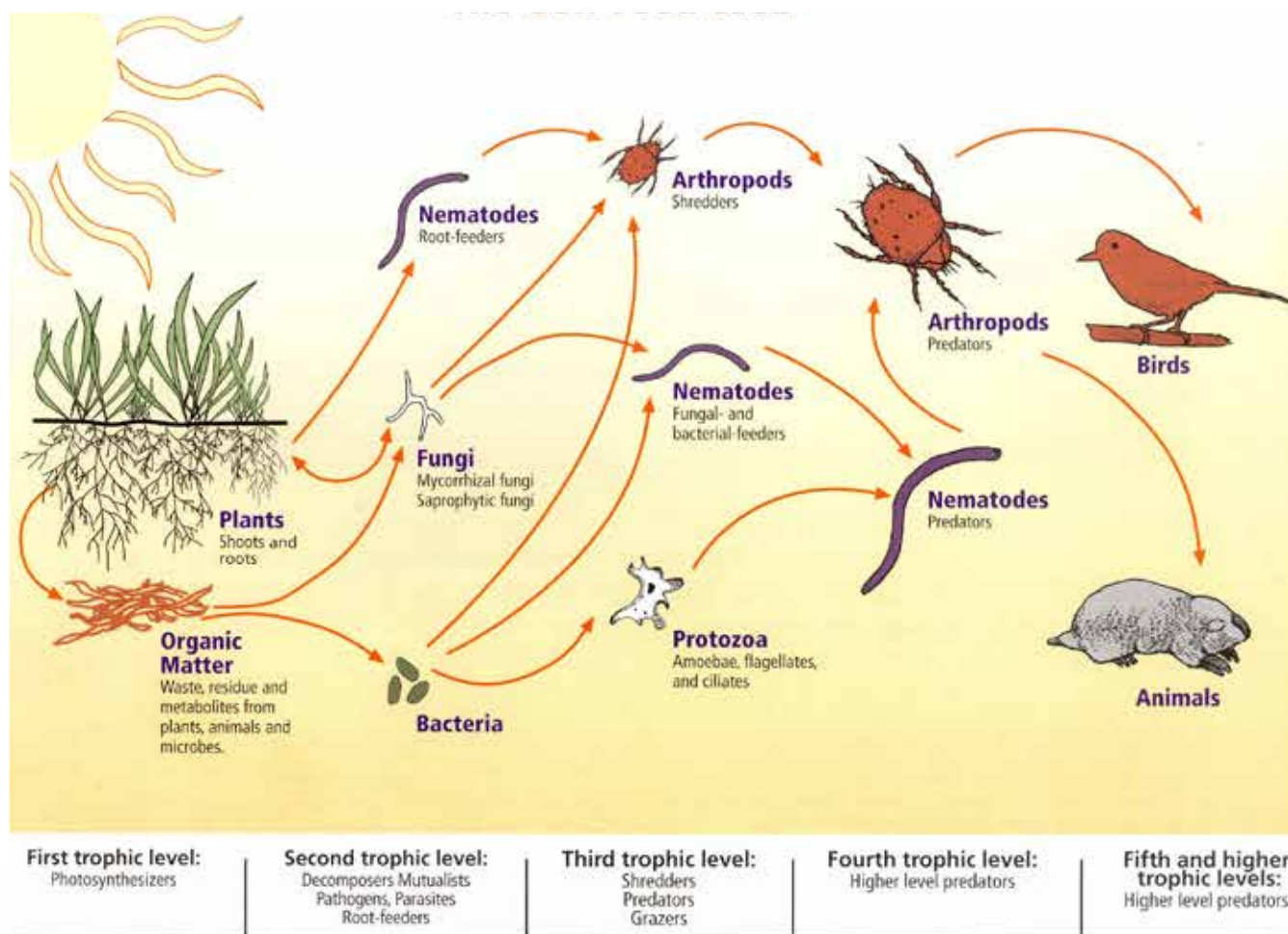
# THE SOIL FOOD WEB

## Organisms and Their Interaction

The soil food web is the community of organisms living all or part of their lives in the soil. A series of conversions of energy and nutrients, as one organism eats another, demonstrates the soil food web in the diagram below.

All food webs are fueled by the primary producers: the plants, lichens, moss, photosynthetic bacteria, and algae that use the sun's energy to fix carbon dioxide from the atmosphere. Most other soil organisms get energy and carbon by consuming the organic compounds found in plants, other organisms, and waste by-products. A few bacteria, called chemoautotrophs, get energy from nitrogen, sulfur, or iron compounds rather than carbon compounds or the sun.

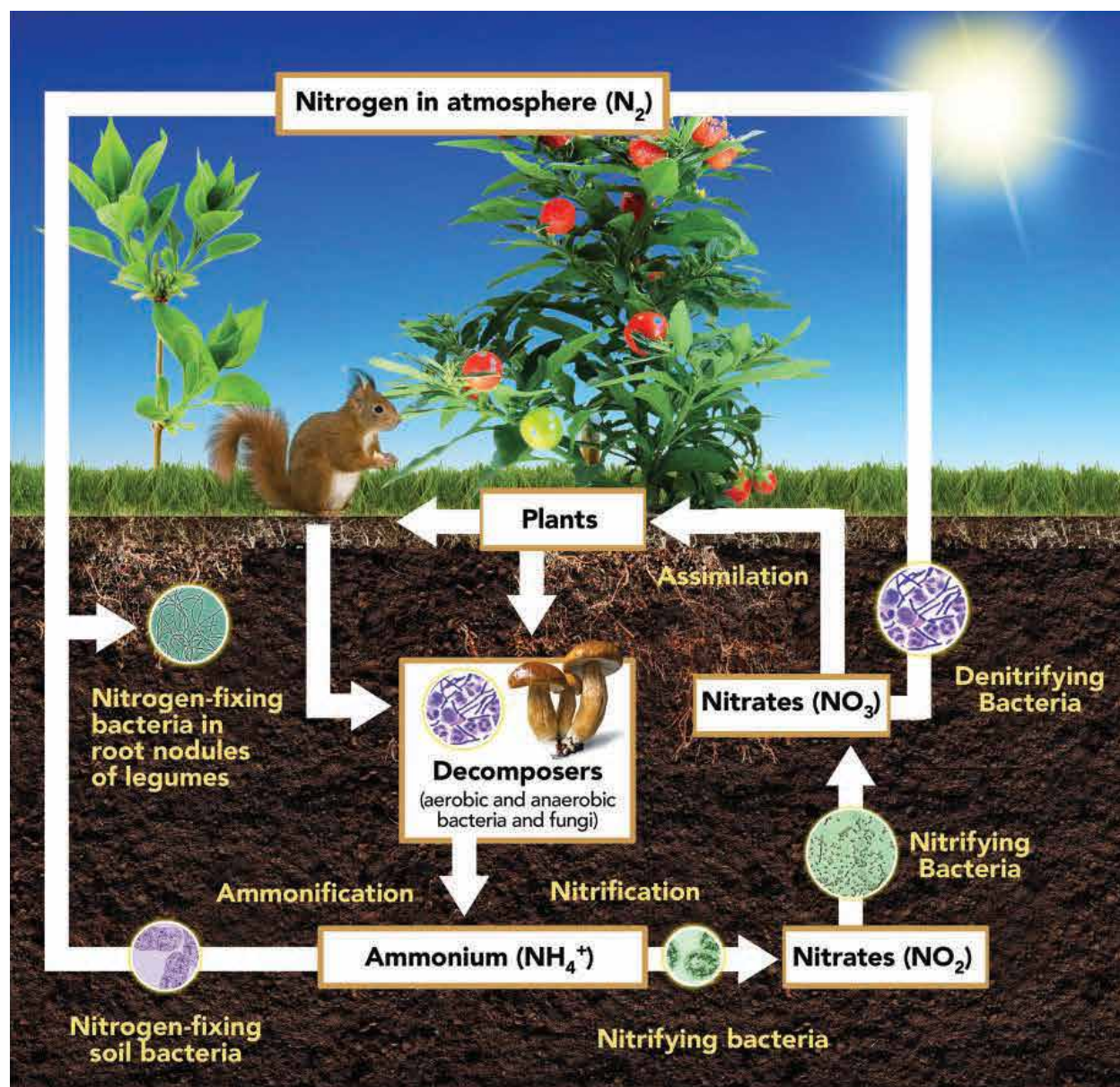
As organisms decompose complex materials, or consume other organisms, nutrients are converted from one form to another, and are made available to plants and to other soil organisms. All plants — grass, trees, shrubs, agricultural crops — depend on the food web for their nutrition.



# NITROGEN CYCLE

*Quantum Growth water management properties occur for the following reasons:*

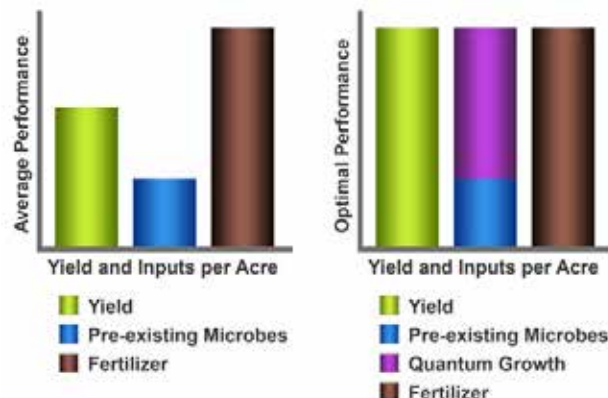
- The microorganisms themselves contain water — approximately 94%.
- The microorganisms inhabit the root zone of the plant and form biofilms. Biofilms store water and other nutrients. Think of them as slow release for water.
- The microorganisms in the Quantum Growth series of products run the nitrogen cycle. Water is a by-product of the numerous chemical reactions that occur through Nitrogen Fixation, Ammonification, Nitrification and Denitrification. The microorganisms can produce up to .74 grams of water per gram of soil substrate.



# WHY YOU SHOULD USE QUANTUM GROWTH

## Restore Balance

We are all trying to maximize the productivity of our land. The beneficial microorganisms that naturally occur in the soil are depleted by excessive use of pesticides, herbicides, fertilizer, and fumigants. Tilling the soil and harvesting further depletes these microbial populations. Therefore it is necessary to return beneficial microorganisms to the soil to restore balance. Growers try to produce higher yields with more plants and chemical additives per acre. This is more plant life than an acre normally supports; therefore, artificially high levels of photosynthetic organisms are necessary to bring the ecosystem back in balance.



## Produce Plant Food

Plant food is sugar, not fertilizer. The microorganisms in Quantum Growth products can use any radiant energy, not just visible light, for photosynthesis. Through photosynthesis, the organisms sequester carbon from the air, combining it with nutrients in the soil to make sugar. They produce this energy more than 10 times faster than plants and share it with their host. Plants also make their own sugars to grow, but will share between 20% - 40% with the microscopic organisms or symbionts that live on their roots and foliage. The beneficial microbes in Quantum Growth will also share the sugars they produce with these organisms, and the host plant does not have to give up energy to support their functions. The plant can retain these sugars for use in its own growth process. With the proper balance of microorganisms, a plant does not have to work as hard to feed itself and all of the organisms that they host and can concentrate on new root development and fruit production.

## Optimize Fertilizer Usage

The microorganisms in Quantum Growth products consume fertilizer quicker than a plant can. When fertilizer is applied with Quantum Growth products, the microorganisms consume the fertilizer and move into the root zone and circulatory system of the plant. The fertilizer does not have a chance to leach, volatilize, or run off because it is not sitting and waiting for the plant to use it. The microorganisms in Quantum Growth take the chemicals in fertilizer and use them to build plant mass, as well as increase their own populations. When the microorganisms die, the fertilizer they consumed becomes readily available to the plant. Therefore, growers use fertilizer more efficiently because the microorganisms are moving the fertilizer into and around the plant.



## Save Water

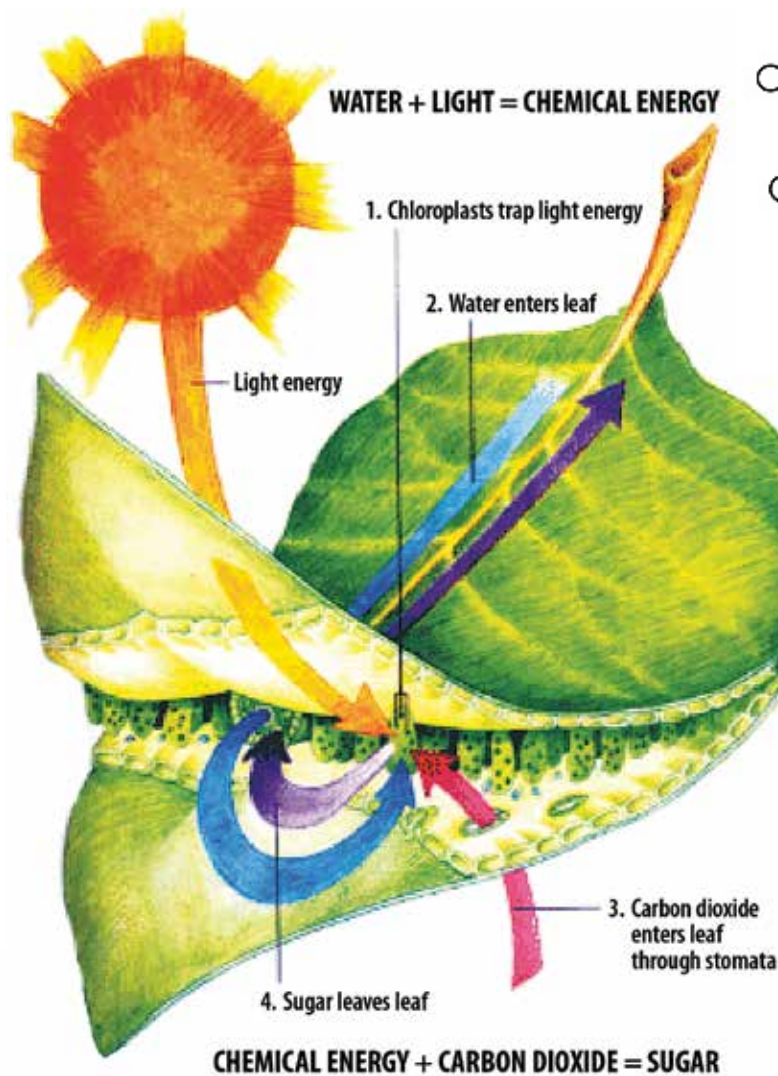
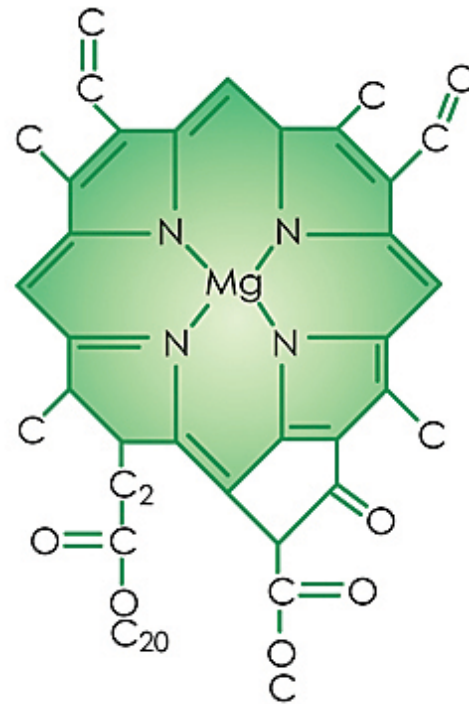
Rarely does a grower provide just the right amount of moisture for their crops. During dry conditions, the microorganisms in Quantum Growth products help a plant retain water by capturing water molecules as the plant exhales through the root zone. As the microorganisms cycle through life, their cells burst making the water available to the plant. When there is too much moisture in the soil, the microorganisms deconstruct water molecules, releasing oxygen into the soil to protect the soil from becoming septic.



# PLANT PHOTOSYNTHESIS

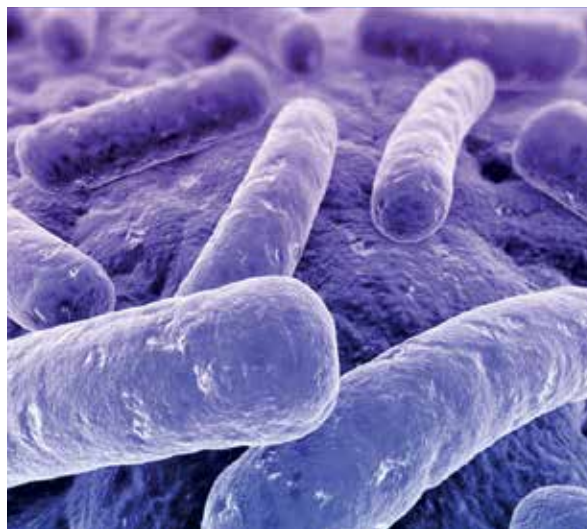
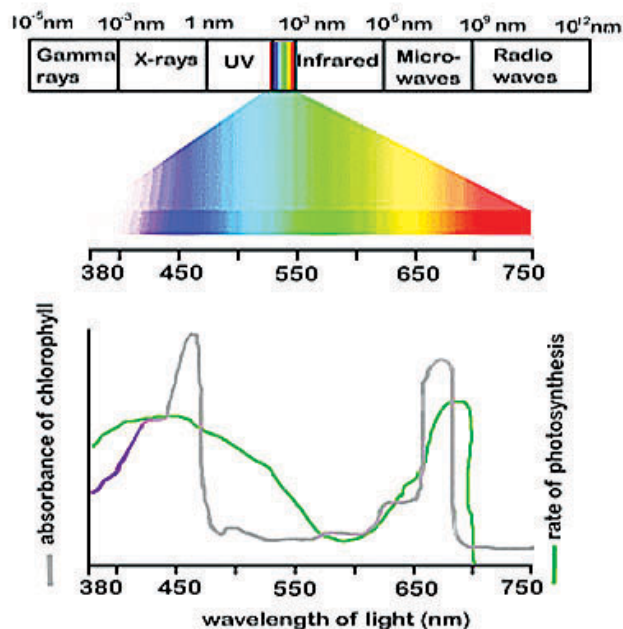
- All living organisms require energy.
- In a typical ecosystem, plants are the primary source of energy.
- Plants obtain energy from the sun through photosynthesis.
- Plants use carbon dioxide, water and light energy to produce sugar and oxygen.

## Chlorophyll



# BACTERIAL PHOTOSYNTHESIS

**Photosynthetic bacteria can harvest *any* radiant energy**



## Bacterial Photosynthesis



- Bacteria also conduct photosynthesis to produce sugars.
- When we think of light, we think of just visible light. The term “light” means any radiant energy. Bacteria utilize the entire radiant energy spectrum, including light that is not visible to the human eye — like radio waves and microwaves.
- Photosynthetic bacteria contain carotenoids and several types of bacteriochlorophyll that can capture this energy.

## SQUASH & PEANUTS

H&R Farms in Glennville, Georgia, ran a trial with Quantum Growth on squash. The trial ended with the treated crops showing a 30% increase in yield versus the control — an increase from 8,800 to 11,424 average pounds per acre.



*Growers Best Practice*

*Growers Best Practice plus  
Quantum Growth*



*Growers Best  
Practice 16 days after  
planting*

*Growers Best  
Practice plus  
Quantum Growth*

A trial on peanuts was run by the Sunbelt Agriculture Expo field team and presented peanuts grown by Growers Best Practices versus Growers Best Practices plus a blend of Quantum Growth. The trial concluded with the Quantum Growth peanuts showing an increased yield of 45.5%.

After the cost of the product is factored in, this represents an increase in net profit of 39% per acre.

The microorganisms in Quantum growth work naturally to provide food and energy for plants, thus allowing them to focus on root growth and fruit growth. This produces a healthier, heartier plant with increased yields and a decreased dependency on supplemental irrigation, fertilizers and pesticides.



*Growers Best Practice*

*Growers Best Practice plus  
Quantum Growth*

# BLUEBERRIES



The photo above shows the test results of the use of Quantum Growth on one-year-old Austin Rabbit Eye blueberry plants.

The plants on left show the Growers Best Practice, while the plants on right show the Growers Best Practice plus Quantum Growth.

## APPLICATION RATES:

1st: 2% solution of 1% Quantum Light and 1% Quantum VSC

2nd: 5 days later a weekly 1% solution of Quantum Light plus Quantum VSC

Note: 1% solution of 14-7-13 liquid time release fertilizer added to each application

***"Your Quantum Growth products worked equally well with all our varieties."***

# TOMATOES

The top pictures on the right follow the progress after transplanting tomatoes in San Joaquin, California. The plant on the top left was removed from a row planted using only water. The one on the top right is a plant removed from a row treated with Quantum Growth. As you can see, there is a significant difference in the size of the roots and the health of the Quantum Growth treated plant.

The picture to the right shows the rows in the field that received water only. The picture below it shows the rows in the field that were treated with Quantum Growth. Once again you can see a significant difference in the growth of the plants between the fields.



UNTREATED



TREATED



UNTREATED



TREATED

## TRELLIS VINEYARDS

In West Fresno County, California, there are two trellis vineyards across the street from one another. The pictures below depict the growth difference between the two vineyards. The top pictures are of the vineyard treated with Quantum, note the heavy foliage and berry formation. The lower pictures are of the opposing untreated field and the difference is considerable.



***"I expected a slightly larger crop this year, but nothing like what I am seeing after using Quantum Growth."***

## ALMONDS

The following pictures are from a three-year-old almond orchard owned by Haupt Farms in Kerman, California. The young trees had displayed a marked stunting in growth, leaf color more yellow than green, and virtually no almond production. They were at a point where the grower thought of possibly tearing out the trees and starting over. Scott Haupt agreed to treat the north thirty acres with Quantum Growth to see if he could save his orchard. The difference in the next four months was nothing less than amazing. The trees at the north end of the field now are green and healthy, while the trees at the south end are still yellow and not producing. The picture on the left is of one of the untreated trees, while the image on the right is one of the trees treated with Quantum Growth.

UNTREATED



TREATED



## TRADITIONAL VINEYARDS

The pictures below are from a Thompson Seedless vineyard in Kerman, California, where the grower has used Quantum Growth late in the growing season. He treated only the south half of this 13-acre vineyard, which had historically under performed. The difference in the foliage and berry formation in the under performing half are equal to or greater than the high performing half of his vineyard.

***The grower's response was,  
"Is it too late to treat the rest of my vines?"***



The pictures below are from a Ruby Red grower in Kerman. This vineyard had a unusual problem with a ribbon running through the 80 acres that had always under performed. After treating with Quantum Growth while the vines were dormant, and again at the beginning of the growing season, we now are seeing new growth on all the afflicted vines. The statement from the grower is, "I intend to treat again next year." This is before he has seen the results of this year's harvest.



## PISTACHIO NURSERY

Root stock from nurseries are the backbone of ever-growing permanent crops in the Central San Joaquin Valley and around the world. The challenges they face are to provide healthy stock to the growers. The mortality rates for this Kerman, California, nursery was in the 10% range before using Quantum Growth. After seeing the mortality rate fall to nearly zero, they now treat with Quantum Growth at transfer and during the entire growth cycle.

***The grower stated that, "these trees will be ready for grafting and shipment well ahead of schedule."***



The photos in the upper left are untreated seedlings. The first four rows in the upper right pictures were treated with Quantum Growth when they were transferred from the hot house to adjust to the sun.

## PEAS



*Randall Webb, right, shows abundant new growth on peas that were already picked three times.*

"When I was told about the science behind the Quantum Growth products, it just made sense to me. After working with it on two successive plantings, all I can say is that it gives the plant what the plant needs when it needs it. If the plant needs nitrogen, it gives it to it.

***"If the plant needs water, it releases water. When the soil needs oxygen, it releases oxygen into the soil."***

Quantum Growth has been the key to growing good crops this year for me. My plants produced over 300 bushels per acre, with new growth on these peas, while my neighbor's field across the street yielded only 130 bushels per acre.

You can't question this kind of success, and I strongly recommend it!"

**Randall Webb**

MB Webb Farms

Tifton, Georgia

# CHERRY TREES

*"In my wildest dreams, I would not have expected this aggressive tree growth."*

"These are photos of the first commercial Tart Cherry orchard to be planted in Arizona. This planting is at an elevation of 5,000 feet above sea level to be sure to allow the trees the cold degree hours needed to promote proper fruit set. The reason I am excited to share this with you is that the only two inputs these trees have seen are water and Quantum-1. The trees were fed about five quarts of Quantum-1 per acre in the first seven weeks and received three gallons of water daily per tree. In the past, I would only hope for 18 inches of growth over a season, not in just seven weeks!

**Bob Weaver**

Omena Organics  
Arizona

## *Bud Break and Growth*



*This is a twig tree showing a bud break within a week of planting.*



*My pen alongside a new growth branch of almost the same diameter.*

## *New Growth and Row at 7 Weeks*



*Tape measure demonstrating 18" of new growth.*



*Consistent results throughout the row.*

## TOBACCO

"We used Quantum Growth on our tobacco fields last year and although we had great conditions for growing tobacco, we definitely saw an increase in yields on the five acres that we treated.

***"We produced heartier, heavier plants that matured earlier."***

This year we expanded our use into the green house and it sure did pay off! We ended up with better quality plants that really set right off when we put them in the field. Anything you can do to help the plants in the greenhouse is a bonus. You take these plants from a perfect growing environment and throw them into hell.. in the field, they are fighting for survival. Quantum Growth gives them a better shot not only to survive, but to also produce higher yields and earlier maturity. This actually helps the plants grow faster. We took them from the greenhouse into field a week earlier this year due to Quantum Growth.

We are now using it for the first time on a crop of peanuts and are excited to see the results!"

**Leroy Winn**

Leroy Winn Farms

Williamston, North Carolina

# GREENHOUSES

The Quantum Growth series of products consists of different combinations of naturally occurring microorganisms that share key traits for plant enhancement. The organisms inhabit the root zone and vascular system of a plant, helping to breakdown, hold, and transport nutrients and water. Photosynthetic strains in the products are capable of converting radiant energy, including the sun's, into chemical energy for plant growth. Other organisms in the Quantum Growth products have the extraordinary ability to unlock chemical bonds, facilitating nutrient uptake that would not be available to the plant in the organism's absence.

The pictures below were taken at Hagan Ace Hardware in Evans, Georgia. Both Lantana plants received the same water and fertilizer that Ace normally gives their plants in their Garden Center. They began treating the plant on the right with Quantum-Light on August 1, 2009.



*Ace Hardware's  
Best Practices  
8/21/2009*

*Ace Best Practices  
plus Quantum Growth  
applied weekly  
for 3 weeks*



*Ace Hardware's  
Best Practices  
9/11/2009*

*Ace Best Practices  
plus Quantum Growth  
applied weekly  
for 6 weeks*

The Quantum Growth Series' consortium of microorganisms combines with the natural soil constituents to provide the following benefits:

- Water Retention and Production
- Increased Plant Health (Brix)
- Increased Root and Plant Development
- Increased Yield
- Control of Fertilizer Runoff
- Faster Seed Germination
- Drought Resistance
- Nutrient Storage

## HOME USE



*Photo taken March 20, 2011.*

"This is a photo of a Christmas Cactus that was given to my mother in 1945, so it's 65+ years old. About ten years ago I was cleaning her home and found the plant in a back bedroom window, barely alive. I brought it home and have been trying to nurse it back to health ever since. While it did get larger and healthier looking with a lot of TLC, it never bloomed.

I applied Quantum Growth in December 2010 and again in January 2011. The photo above shows the results... remarkable!"

**Suzanne Davis**

Fresno, California

## SAVES WATER

Rarely does a grower provide just the right amount of moisture for their plants. Usually we have too much or too little. Quantum growth products help the plant in either situation.

During dry conditions, the microorganisms in Quantum Growth help a plant retain water by capturing water molecules as the plant exhales through the root zone. Additionally, the organisms can build water by combining oxygen with hydrogen. As the microorganisms cycle through life, their cells burst making water available to the plant. When there is too much moisture in the soil, the microorganisms move water away from the roots so the plant can breathe. They also release oxygen to protect the soil from becoming septic.

*During this 2-week trial on Vinca, each plant received only one 8-ounce dose of water after initial 64-ounce soak.*



DAY 1  
Water plus  
Quantum Growth

DAY 1  
Water only



DAY 14  
Water plus  
Quantum Growth

DAY 14  
Water only

*The trial on lettuce below shows the water management properties of the microorganisms in Quantum Growth. These pictures were taken after 5 days without water.*



Quantum Growth at normal  
rate (2 oz./gal.)



Quantum Growth at normal  
rate (.25 oz./gal.)



Growers Best Practice

# GET READY TO GROW

*Are you ready to grow the healthiest plants possible? Want to cut the water and fertilizer you use in half? Let us show you what Quantum Growth can do. Quantum Growth is a liquid complex made up of the same microorganisms that began life here on earth and is now available to you.*

## HOW IT WORKS

Quantum Growth is a living consortium of microorganisms including photosynthetic strains designed especially for the treatment and growth enhancement of all types of plants including fruits and vegetables, turf, trees, shrubs, ornamental and flowers. Regular use restores nature's microorganisms to the soil allowing the plant to absorb the nutrients it needs to reach its full growth potential. The results are evident in the form of more bountiful blooms, larger and more plentiful fruits and vegetables, well-established root systems, thicker stalks and even greener leaves.



A healthy soil has a high microbial content. Excessive use of pesticides, herbicides and fumigates depletes the soil of these all-important microorganisms. Quantum Growth actually helps reset the soil to its original, enriched state. The microorganisms in Quantum Growth convert light, carbon and even fertilizer into sugar, or plant food, more than 10 times faster than the plants would themselves. A biologically active soil is like having a fertilizer factory making 10-5-2 continually.

The microorganisms in Quantum Growth help a plant retain water by capturing water molecules as the plant exhales through the root zone. Combining oxygen and hydrogen to build water, the micro-organisms store the water and are able to release it to the plant in dry conditions.

The microbes are fighting for their home, the host plant.  
Gause's Law of Competitive

Exclusion states "two species competing for the same resources cannot stably coexist if other ecological factors are constant. One of the two competitors will always overcome the other, leading to either the extinction of this competitor or an evolutionary or behavioral shift towards a different ecological niche." Since the photosynthetic bacteria double in population every five minutes and most pathogens and diseases double in 48 to 72 hours, many times the microbes will win by simply out-populating the enemy.

## GO GREEN

The future of agriculture is moving away from chemical fertilizer products. Man is turning to nature for a solution.

Quantum Growth is 100% natural, and plants treated with it use less water and less fertilizer. Commercial and residential growers will save on operating expenses and contribute to a cleaner environment.

**IT'S A WIN-WIN SITUATION.**

## OUR PRODUCTS

The Quantum Growth Series was designed to save water, reduce fertilizer runoff, grow healthier plants and increase yield. Each unique product may be used independently or in combination, as determined by the needs of a grower. The Quantum Growth Series was formulated to be incorporated into growers' existing cultural practices and in addition to commonly used products.



### QUANTUM-1

An organic soil amendment that utilizes the core technology of Quantum-Light and the high quality peat humus extract found in the Quantum-HSC. This is a first generation product that provides plant enhancement benefits that address many general concerns for a grower or golf course superintendent such as reduced water use and control of fertilizer runoff.



### QUANTUM-HSC

A specific consortium of spore-forming cultures in combination with high quality peat humus extract for soil and crop enhancement. This product features a high spore-forming microbe count, high nutrient value and extended shelf life.



### QUANTUM-LIGHT

A unique proprietary consortium that features select photo-synthetic microorganisms and natural growth factors that drive plant energy function. This microbial consortium maximizes plant photosynthesis and increases additional reserve energy from nutrients, carbon, and light. Quantum-Light contains no humic component. This breakthrough discovery is the core discovery in the Quantum Growth series.



### QUANTUM-VSC

A wide-ranging microbial consortium, which includes the core technology of both Quantum-Light and Quantum-HSC, along with additional spore-forming microbes selected for their ability to breakdown accumulated organics, such as thatch, black layer, and detritus. Through this breakdown process, the nutrients within the material are released and available for plant growth.



### QUANTUM-REVIVE

A revision of the core technology to address specific plant health concerns. Those concerns include assisting plants to recover from drought, disease, and insect damage. Quantum-Revive does not contain a humic component.

## FREQUENTLY ASKED QUESTIONS

### **Q.** *How does Quantum Growth save water?*

**A.** The 48% reduction claims come from our laboratory bench experiments. The water reduction you will see will be determined by your soil types. Some soils will hold more water and some will hold less. A plant can be a wick or a sponge. When the plant is too dry, the microorganisms catch water as the plant exhales through the root system – turning it into a sponge. When there is too much water the microorganisms move water away from roots so the plant can breathe. Rarely do we see just the right amount of water. Usually we have too much or too little. Quantum Growth helps the plant in either situation.

### **Q.** *How does Quantum Growth prevent run off?*

**A.** The microorganisms in Quantum Growth take the chemicals in fertilizer and use them to build plant mass as well as increase their own populations. The microorganisms take Nitrogen and make protein. They take Phosphorus and make Adenosine triphosphate. And, they take Potassium and make electrolytes. When the chemicals are used in this matter, they are bound in the plants and the microorganisms and do not run off into water.

### **Q.** *How does Quantum Growth benefit the soil?*

**A.** Soil is often depleted of microorganisms by excessive use of pesticides, herbicides and overuse of fertilizer. Tilling the soil and harvesting further depletes populations. Therefore, it is necessary to re-turn microorganisms to soils, thus restoring balance. Quantum Growth helps hold soil particles together, retain water and retain nutrients.

### **Q.** *How does Quantum Growth produce healthier plants?*

**A.** Plant food is sugar, not fertilizer. The microorganisms in Quantum Growth use light from the sun and carbon from the air to make sugar. Plants then consume this sugar and use it to grow and stay healthy. Plants also make their own sugar to grow, but the microorganisms in Quantum Growth make sugar more than 10 times faster than the plants. Therefore, the plants do not have to work as hard to grow and stay healthy.

### **Q.** *How does Quantum Growth reduce the need for fertilizer by up to 50%?*

**A.** The microorganisms in Quantum Growth consume fertilizer quicker than a plant can. When fertilizer is applied with Quantum Growth, the microorganisms consume the fertilizer and move into the circulatory system and the root zone of the plant. That is where they live. So, when they die, the fertilizer they consumed becomes readily available to the plant. Therefore, you can use less fertilizer because the microorganisms are going to quickly and efficiently move the fertilizer into and around the plant. The fertilizer does not have a chance to wash out or volatilize because it is not sitting there for days waiting for the plant to use it. Our laboratory tests show that half rate fertilizer used with Quantum Growth works best.

## FREQUENTLY ASKED QUESTIONS

### **Q.** *Can I make a stock solution with Quantum Growth?*

**A.** Yes. When using Quantum Growth in a stock solution like a watering can, use the product within two days. If the stock solution can be sealed in a container, then it will be stable for 30 days. When longer storage of watering solutions is desired, Quantum Growth can be sealed and refrigerated for 90 days. Always remember to reseal the Quantum Growth bottle and the stock container after use. This is what makes the microorganisms inactive.

### **Q.** *How many microorganisms are in each gallon of Quantum Growth?*

**A.** Each gallon has over 200 Billion microorganisms. This product was originally designed for commercial agriculture and is super concentrated. A little goes a long way.

### **Q.** *How is Quantum Growth different from other biological products?*

**A.** Quantum Growth is different from other biological products for the following reasons:

1. Photosynthetic microorganisms
2. Stable formula of vegetative cultures
3. Shelf stable for 3-5 years
4. Super high count of microorganisms (200 Billion per gallon)
5. Production method provides product with consistent results
6. Contains no fertilizers or supplemental amino acids No one else is selling photosynthetic microorganisms.

Quantum Growth also contains other vegetative cultures that work together as a team. It is not just one type of microorganism doing the job, it is +30. The breakthrough is not that scientists and universities have figured out what these microorganisms do, but that they can be made shelf stable for 3-5 years. The unique, proprietary blend of microorganisms combined with a novel production process generates extremely high populations. Due to Quantum Growth's pharmaceutical production process, each bottle of Quantum Growth is consistent and provides consistent results. Because Quantum Growth contains no fertilizer it is easy to use with your favorite fertilizer or potting soil containing fertilizer. You don't have to worry about fertilizing twice. Quantum Growth makes the most of the fertilizer you do use.

# AGRICULTURAL APPLICATION RATES

SPRAY MIXTURE pH SHOULD BE BETWEEN 6.5 AND 7.5 (OPTIMAL); WILL TOLERATE FROM 3.0 TO 9.0  
DILUTION W/ WATER PRIOR TO MIXING WITH LIQUID FERTILIZER IS PREFERRED, HOWEVER NOT REQUIRED.

Note: If applying only once, apply at full growing season rate at initial application.

CROP	RATE PER ACRE	APPLICATION DIRECTIONS
SOD	4.0 qts - Broadcast	Initial Application - Apply at planting, sprigging or stem elongation following lifting.
GRASSES GROWN FOR SEED	2 qts at subsequent applications	Subsequent applications at 14 to 21 day intervals.
ALFALFA		
SMALL GRAINS (Wheat, Oats, Barley, Rye)	4 qts per acre over growing season, may exceed as needed	
BEAN (SNAP)	2.0 qts - In a Band	Initial Application - Apply at planting.
NAVY		
PINTO	1.0 qts at subsequent applications.	Subsequent applications at 14 to 21 day intervals.
KIDNEY		
BLACKEYE		
CARROT	6 qts per acre over growing season, may exceed as needed	
CABBAGE	2.0 to 3.0 qts - In a Band	Initial Application - Mix in transplant water or immediately after transplanting through drip lines or as topical spray.
CAULIFLOWER		Apply in drip irrigation water or as topical spray at 14 to 21 day spray intervals.
CELERY	2 qts at subsequent applications	
BROCCOLI		
BRUSSEL SPROUTS	6 qts per acre over growing season, may exceed as needed	
CORN (SWEET & FIELD)	2.0 to 4.0 qts - In a Band	Initial Application - Apply at planting.
AND SEED CORN	1.0 qts at subsequent applications.	Subsequent applications at 14 to 21 day intervals.
CUCURBITS	4 qts per acre over growing season, may exceed as needed	
CUCUMBER	4.0 qts - In a Band	Initial Application- Apply at planting or at crop emergence
CATALOPE	2 qts at subsequent applications	Subsequent applications at 14 to 21 day intervals.
MUSKMELON		
HONEYDEW MELON		
WATERMELON		
SQUASH		
PUMPKIN	6 qts per acre over growing season, may exceed as needed	

ONION LEEK SHALLOT GARLIC ONION GROWN FOR SEED PEANUTS	4.0 qts - In a Band	Initial Application- Apply at planting or at crop emergence
	2 qts at subsequent applications	Subsequent applications at 14 day intervals.
	6 qts per acre over growing season, may exceed as needed 4.0 qts - In a Band	Initial Application- Apply at planting
	1.0 qts at subsequent applications.	Add to irrigation water or as a topical spray every 14 to 21 days
PINE SEEDLINGS	4 qts per acre over growing season, may exceed as needed 2 qts.	Initial Application- Apply at planting
	2 qts at subsequent applications	Subsequent applications at 14 to 21 day intervals.
POTATOES	8 qts per acre over growing season, may exceed as needed 2.0 qts - In a Band	Initial Application- Apply at planting
	1.0 qts at subsequent applications.	Subsequent applications at 14 day intervals.
	6 qts per acre over growing season, may exceed as needed 2.0 qts	Initial Application- Apply at planting or at emergence
SEEDBEDS	1.0 qts at subsequent applications.	Add to irrigations water or as a topical spray every 14 to 21 days
	6 qts per acre over growing season, may exceed as needed 2.0 qts	Pre-plant incorporated or at planting
	4 qts per acre over growing season, may exceed as needed 2.0 qts - In a Band	Initial Application-Mix in transplant water or immediately after transplanting through drip lines or as topical spray. Apply in drip irrigations water or as topical spray at 14 to 21 day spray intervals.
TOMATOES PEPPERS	1.0 qts at subsequent applications.	
	6 qts per acre over growing season, may exceed as needed	
CITRUS-MATURE TREES	4.0 qts - In a Band October	3 applications per year in October/February/June
	4.0 qts - In a Band February	Apply beneath drip-line in 30-100 gallons of solution or with fertigation through drip irrigation.
	2.0 to 4.0 qts - In a Band June (16 oz. per Acre, every 4 weeks)	
	6 - 8 qts per acre over growing season, may exceed as needed	
CITRUS-YOUNG TREES	8.0 OZ.	Weekly through drip irrigation
CITRUS-NEW PLANTINGS	2.0 OZ. per tree	Add Equity™ to mudding water (1-5 gallons per tree)
	(6 TIMES)	Apply in conjunction with fertilizer applications

FRUIT TREES	4.0 qts - In a Band October	Apply beneath drip-line in 30-100 gallons of solution	
	2 qts at subsequent applications	Micorjet drip or direct band at bud break and shuck split	
COTTON	8 qts per acre over growing season, may exceed as needed		
	2.0 qts - In a Band	Initial application-May be applied with starter fertilizer at planting in furrow as a band	
TOBACCO	1.0 qts at subsequent applications.	Apply at 14 to 21 day spray interval (may be applied with herbicide or top dressing)	
	6 qts per acre over growing season, may exceed as needed	Initial Application-Mix in transplant water or immediately after transplanting as topical spray.	
HORTICULTURE	4.0 qts - In a Band	Apply at 14 to 21 day spray intervals	
	2 qts at subsequent applications		
Drench Guidelines	8 qts per acre over growing season, may exceed as needed		
Unit Type	Plug Trays	Concentration in fl oz/100 gal mix	per sq ft
		mix volume	
Seed Germination less than 2" deep	2-4 oz	6-12 oz to 12-24 oz	1/8-1/4 pt
		2-4 oz	1/4 pt
Seed Germination 2"-4" depth, 3"-4" pots	3-6 oz	3-6 oz	1/2 pt
		3-6 oz	1 pt
Seed germination >4" depth, 5" pots	6" container or greater (up to 2 gals)	6-12 oz	2 pt

**Note\*\*\*** Under stressed conditions, increase rate of product and/or application rate by 50%.  
Whenever possible measure improvements via soil and tissue assay and document effect.

## WHERE TO USE \ WHAT QUANTUM PRODUCT WHEN?

Use Quantum-1® in sandy soils.

Use Quantum VSC® in heavy clay, organic, compacted, septic or flood damaged soil.

Use Quantum Light ® in rich well drained, high quality soils.

When frequent applications are being used to force growth and/or recover from chemical and/or environmental stress or physical damage. Quantum-Light ® may be used every 20 minutes in Green House applications, and everyday in Farms, Nurseries and Turf.

AEM has found from our most successful clients that using 50% Quantum VSC® and 50% Quantum-Light® provides the highest level of performance in most applications. The application rates presented in this document provide the most cost-effective rates that will yield significant improvement in plant performance.

## BIOLOGICALLY FARMED FIELDS



This aerial photo shows snow that has melted off of biologically active fields on a farm near Springville, Utah. The photo was taken in January of 2004. Tillage and soil types are essentially the same on the dark-colored/melted fields and the neighboring snow-covered fields.

The agronomic difference is that the warmer fields are more biologically active following nine years of a fertility program which enhances soil biological life. Increased activity of beneficial microbes and fungi in the soil also converts crop residue into available nutrients, improves soil tilth, raises water holding capacity, and enhances crop yield potential.

# HEALTHY SOILS ARE: *full of life.*

## MANY PEOPLE DON'T REALIZE THAT SOIL, ESPECIALLY HEALTHY SOIL, IS FULL OF LIFE.

Many people don't realize that soil, especially healthy soil, is full of life. Millions of species and billions of organisms make up a complex and diverse mix of microscopic and macroscopic life that represents the greatest concentration of biomass anywhere on the planet.

Bacteria, algae, microscopic insects, earthworms, beetles, ants, mites, and fungi are among them. All together, their value has been estimated at \$1.5 trillion a year worldwide.

Estimates vary, but if you could weigh all the organisms in the top six inches of soil on an acre of land, you'd find they would weigh between 2,500 pounds to more than 5,000 pounds, depending on how healthy the soil is. That is a LOT of life.

What these low-lying creatures lack in size, they make up for in numbers. Consider bacteria, the soil microbes with the highest numbers, for example. You can fit 40 million of them on the end of one pin. In fact, there are more soil microorganisms (microbes for short) in a teaspoonful of soil than there are people on the earth.

These microbes, which make up only one-half of one percent of the total soil mass, are the yeasts, algae, protozoa, bacteria, nematodes, and fungi that process soil into rich, dark, stable humus.

Like other living creatures, the organisms in the soil also need food and shelter. Some feed on dead organic matter, and some eat other microbes. As a group, they cycle nutrients, build the soil and give it structure.

The healthiest soils are those with a diversity and abundance of life. Farmers with the healthiest soils nurture that life by creating a diversity of plant life above the soil surface, with year-round ground cover, no tillage, and judicious pesticide use.



unlock the  
**SECRETS**  
IN THE  
**SOIL**

# HEALTHY SOILS ARE: *full of life.*

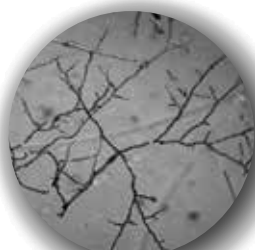


Understanding that the soil is full of life is a game-changer for farmers who are farming with healthy soils in mind. For those producers, farming centers around feeding the organisms that build healthy soils.

These farmers understand that tillage, the turning of the soil that has been the standard for growing crops for years and years, is disruptive to soil microbes and destructive to the soil system.

Instead, they disturb the soil as little as possible. And, they grow a diversity of living plants in the soil as much of the time as practical, covering the soil and offering food to soil microbes through living roots. Those soil organisms, in turn, cycle nutrients back to the plant, allowing it to grow and flourish.

It's a natural, symbiotic system that leads to healthy soils and more sustainable and profitable agriculture.



## ORGANISM WHAT DOES IT DO?

### BACTERIA

Feed on organic matter, store and cycle nitrogen, and decompose pesticides.

### FUNGI

Up to 3,000 species of fungi are in the soil. Some feed on dead organic matter like crop residues that are more difficult to break down – others are parasites that attack other microbes. Some fan out from the root to get more nutrients and hold more water for the plant, delivering nutrients to the plant in exchange for carbon.

### PROTOZOA

Eat bacteria, fungi, and algae. When they eat bacteria, their main food source, they unlock nitrogen that's released into the soil environment slowly. They convert organic nitrogen to inorganic nitrogen that's available to plants.

### MITES

Decompose and shred organic matter as an important part of the nitrogen cycle.

### NEMATODES

These microscopic worms are an important part of the nitrogen cycle. Most are non-pathogenic and don't cause disease. They eat other organisms in the soil.

### EARTHWORMS

Expel partially decomposed organic matter, produce nutrient-rich casts, and make lubricated tunnels that aid soil structure and water movement in the soil.

*Note: It's important to know how these organisms contribute to building healthy soil, but it's also important to know what harms them. Both tillage and the non-judicious use of pesticides can harm these important organisms.*

# GOLF COURSES

## *Black Layer & Roots*

The microorganisms in the Quantum Growth series of products aid in the recycling of organic matter. The photosynthetic bacteria in Quantum Growth uses any radiant energy in order to grow. Therefore, the cells can grow in the soil without visible light, thus providing energy to other soil organisms accelerating the decomposition and recycling process that results in reduced black layer and thatch.



The pictures above are from a golf course built on an abandoned mining operation in Southwest Florida. The poor soil quality contributed to the formation of black layer, which prevented the golf course superintendent from being able to grow roots over 1.5 inches long. The superintendent began using Quantum Growth and after three short weeks made the following comments:

***"I wanted to let you know that what we found with the cores we pulled was astounding! Four weeks ago I checked root depth and mass on the greens and could not find a healthy white root more than an inch long. Yesterday, virtually all of the cores exhibited phenomenal root mass with healthy roots exceeding 4 inches!"***

# GOLF COURSES

## *Root Growth & Development*

The microorganisms in Quantum Growth products process radiant energy, carbon from the air and nutrients in fertilizer to make sugar. Plants then consume this sugar and use it to grow and stay healthy. Plants also make their own energy and sugar to grow, but the microorganisms in Quantum Growth products make sugar more than 10 times faster than the plants. With a readily-available food source at their root system, the plants do not have to work as hard to feed themselves and the other organisms that they host and can concentrate on root growth and development and fruit growth.

The turf sample on the left has been treated with the Quantum Growth Series for three months. The visual evidence would indicate an increase in root mass of greater than 25%. Note the increase of moisture retention of the treated sample. The microorganisms in Quantum Growth products possess an amazing ability to manage soil moisture; manufacturing water during dry conditions and releasing oxygen when there is too much moisture in the soil to keep it from becoming septic.



“The Quantum Growth plug has a larger mass and root hairs where as the control sample does not. Both plugs were taken out of healthy turf in the same fairway, except one end has been treated with Quantum Growth.”

- Assistant GCS, Southwest FL

# CHAMPIONS GATE GOLF RESORT

"Our greens are Flora-Dwarf Bermuda, which is almost non-existent in the industry now because of their fragile nature. They are typically a very shallow rooting grass. When we began using Quantum Growth in 2007, we were at about a one-inch root depth and today we have more than doubled our root mass with all greens having at least two-inch depth and some more than three inches — which is unheard of!

We didn't see any overnight success with Quantum Growth, but have seen more of a gradual strengthening of our green complexes.

***"Our greens are healthier today than they have ever been and they are ten years old this year."***

Currently, we are on no maintenance fungicide program at all. In 2006, we spent \$50,000 - \$60,000 on fungicides and now we are less than 25% of that figure, which represents a savings of \$35,000 - \$40,000 per year. In fact, I haven't sprayed any fungicides at all in the last 60 days and with all the rain and heat that we have had this summer, I would typically be covered in algae. But, knock on wood, we haven't seen any algae build-up at all.

This year to date we have aerified and double verticut four times and I can promise you that they are healing faster and overall are just healthier than ever before. I am extremely happy with the results that Quantum Growth has provided and wholeheartedly recommend the products to any superintendent."

## **Art Hampton, GCS**

Director of Golf Maintenance  
Champions Gate Golf Resort  
Orlando, Florida

# TOM SELVIG'S TECHNICAL PAPER

The **Quantum Growth Series** is a liquid complex containing microscopic life. These microorganisms catch photons from the sun. This light energy is then stored as matter in the form of sugar.

$E=mc^2$       Energy = Life

What value is there in using these photosynthetic organisms in growing and nurturing plant life? The world is not sterile, nor was it meant to be. Plant life will share between 20%-40% of the sugars they produce with naturally occurring microscopic organisms or symbionts that grow on their roots and foliage. This sharing process provides the symbionts with energy. This energy is used in part to nourish plants by processing nutrients (NPK and essential elements) that may be chemically bound and otherwise unavailable to the plant.

These symbionts also provide defense and suppression of pathogens. This process takes place in part by competition. These symbionts grow faster than the pathogens, outpacing them for nutrients and space. The above symbiotic process is well known and has been used in agriculture for many years.

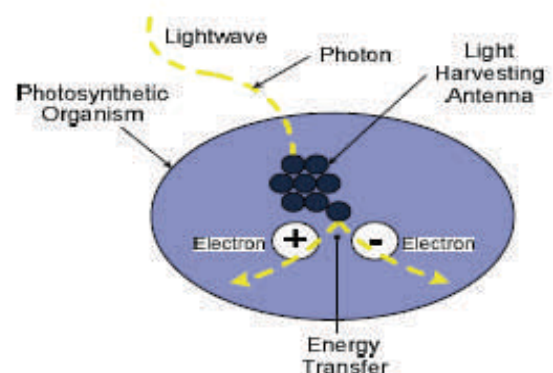
The photosynthetic organisms in Quantum Growth provide the benefits of symbiosis. As detailed above, the organisms provide the energy they need to function as well as energy for the plant.

The photosynthetic organisms contained in Quantum Growth prefer life in communities (biofilms). These communities tend to be resilient and self-sustaining. Successful initial inoculation may be maintained with low-dose management.

The photosynthetic organisms in Quantum Growth are naturally occurring, and their ability to store light as sugar requires that these organisms consume CO<sub>2</sub>. The carbon is needed for sugar and the oxygen is used for electron transfer. Most CO<sub>2</sub> is recycled by photosynthetic organisms, which grow naturally in water. This means that in addition to improving plant growth and overall health, Inoculaid® is also a powerful tool for reducing Greenhouse Gases.

## Benefits:

- Retains water in soil
- Reduces "pounds on ground".
- Keeps irrigation lines clear.
- Non-toxic, non-pathogenic organisms.
- Stable formula. (Shelf life 3-5 Years)
- Safe to tank mix with most chemicals.



## Introduction

Quantum Growth is a consortium of over 20 different types of natural, beneficial vegetative bacteria. Many of the species contained in Quantum Growth are well published in peer-reviewed literature (1,2,3) in terms of their activity against both fungal and bacterial pathogens, including *Phytophthora infestans* (*P.infestans*), the organism responsible for late blight of tomatoes and potatoes. Multiple mechanisms are likely responsible for the observed anti-fungal and anti-bacterial effects, including direct synthesis of toxic compounds (4), induction of apoptosis (5), or simply through the principle of Gause's Law of competitive exclusion. Several other commercially available biological fungicides have demonstrated mixed results against fungal infections, including Serenade (*Bacillus subtilis*) and Sonata (*Bacillus pumilus*). These products all contain single strains. The consortium of microbes in Quantum Growth acts in a manner similar to the drug "cocktails" that have demonstrated increased efficacy, for example in HIV treatments. This multi-strain approach and inherent redundancy attacks pathogens through multiple-mechanisms, and the effects are synergistic, not additive.

## Strains

The following strains have been verified to be contained in Quantum Growth through DNA sequencing.

*Bacillus amyloliquefaciens*, *Bacillus subtilis*, *Bacillus licheniformis*, *Bacillus megaterium*, *Bacillus circulans*, *Bacillus pumilus*, *Rhodopseudomonas palustris*, *Curtobacterium flaccumfaciens*, *Rhodospirillum rubrum*, *Nitrobacter winogradsky*, Family Actinomycetes- (*Streptomyces lydicus*) *Pseudomonas fluorescens*

## Suggested Protocol

- A) Prophylactic Treatment with Quantum Growth. To test the efficacy of Quantum Growth as a preventative treatment against *P.infestans* on tomato plants:
- Shake the bottle of Quantum-Revive well before diluting.
  - Dilute Quantum-Revive 10% in water (deionized or distilled is preferred, tap water is acceptable, please do not use any chlorinated water). If plants are available, a dose-dependent effect may be studied, using concentrations of 2.5%, 5%, 10%, 20% and 40%.
  - Spray the foliage of the plants to wet. Be sure to cover both sides of the leaves. Leave control plants untreated.
  - After 12-24 hours, infect with *P.infestans*. Note the severity and time course for disease.
- B) Treatment of diseased plants with Quantum Growth. To test the efficacy of Quantum Growth as a treatment against active *P.infestans* infection on tomato plants:
- Shake the bottle of Quantum-Revive well before diluting.
  - Dilute Quantum-Revive 10% in water (deionized or distilled is preferred, tap water is acceptable, please do not use any chlorinated water). If more plants are available, dose-dependent effects may be studied, using concentrations of 2.5%, 5%, 10%, 20% and 40%.
  - Spray the foliage of the plants to wet on mildly active infection. Be sure to cover both sides of the leaves. Leave control plants untreated.

- Note the severity and time course for the disease suppression. Necrotic tissue will not be recovered, so note the progression of new disease spread. Also note the growth of new foliage growth as well as flowering.
- Repeat with a 5% application on a weekly basis.

#### General product notes:

- Shake Quantum Growth well before using.
- Quantum Growth can be stored at room temperature. Do not freeze, or allow the temperature to go above 105°F.
- Seal bottle well after use.
- Do not store in diluted form. If diluted product is needed for additional applications, dilute in water right before each use.
- Do not use Quantum Growth with chlorinated water, or with any other antibiotics or fungicides.

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