

# Alfalfa with BioGrow 365

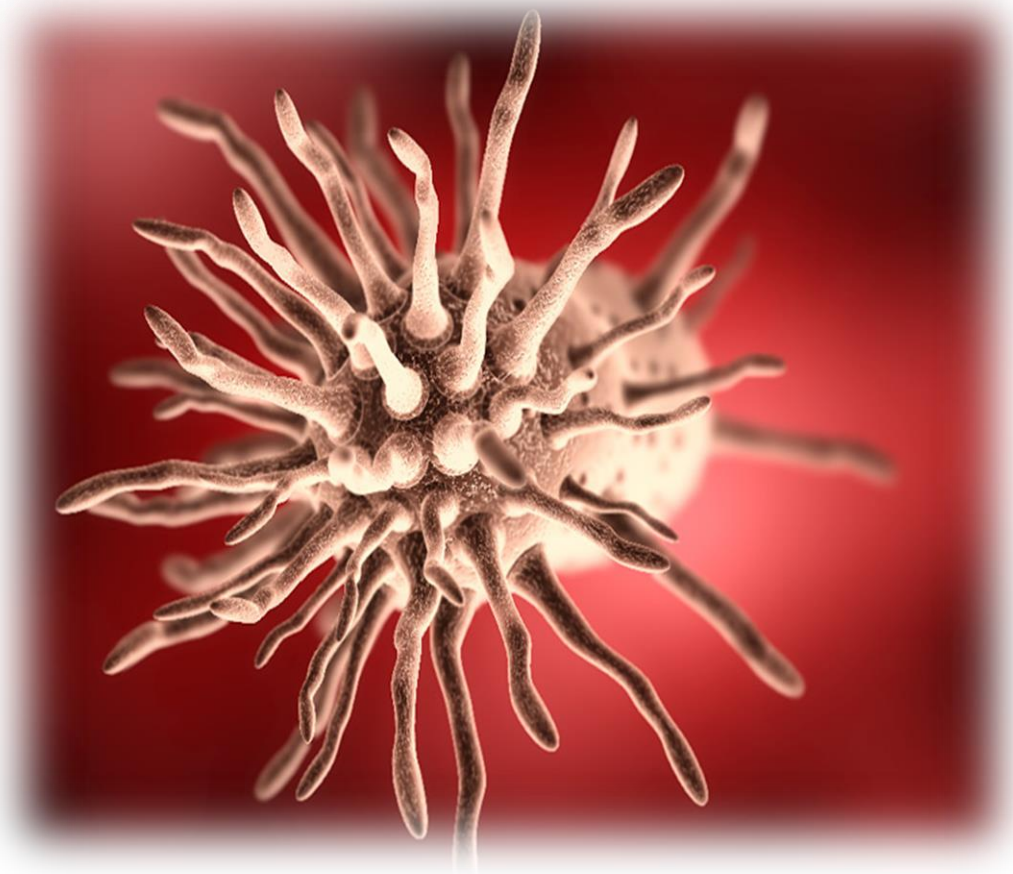
- Higher Yields
- Higher TDN
- Lower Cost
- Substantially Improved Soils
- More Drought Resistant Crops



There's A New Kid In Town



# Part 1: The Microbial Science Behind BioGrow 365



Beneficial microbes are essential in transforming nutrients in soil into the mineral forms that plants can use. All the fertilizer in the world won't help without the proper microbiology in soils. ***“Scientists have known for more than a century that it is not, in fact, the plants that manage the trick of pulling nitrogen out of the air, it is the Rhizobial Bacteria (microbes) living in nodules on their roots.”***

Source: *Scientific American* August 20, 2013



## Synthetic Fertilizers Science Compared to BioGrow 365

Modern Synthetic fertilizers essentially were transformed when facilities that produced ammonia and synthetic nitrates for explosives were converted to the production of nitrogen based fertilizers at the end of the Second World War.

The primary ingredients found in most synthetically produced fertilizers contain three elements; Nitrogen (N), phosphorus (P), and potassium (K). For this reason, synthetic fertilizers are often referred to as NPK fertilizers. Nitrogen is the primary need for pushing plant growth so for the purposes of this brief discussion we will only deal with it; however the processes involved in synthesizing phosphorus and potassium are similar.

The air we breathe is approximately 78% nitrogen. Nitrogen is a tricky element in that it is tightly bound, and as such it has to go through a process of alterations or become "fixed" before it can be made available and useful for a plant. Becoming fixed is the first step in the process. The second step requires a further procedure that changes the nitrogen from an organic to a mineralized form that can only occur through microbiology. At the turn of the century, it was found that when air was exposed to the hydrogen molecules in natural gas, the nitrogen would "fix" to the hydrogen when the mixture of air and natural gas was exposed to high heat and pressure. Thus, we found a way of capturing atmospheric nitrogen for agricultural use. Having said that, there are complications. The nitrogen that is fixed is not by itself. Rather, it is found in the ammonia that is created in the process (NH<sub>4</sub>). A common fertilizer created in this way is called anhydrous ammonia. It is the most common as it is the first chemical produced in the process, has high nitrogen content, and is kept in liquid form under pressure for application. While a high source of Nitrogen, anhydrous ammonia and its granular counterparts have many drawbacks. First, it is poisonous. Exposure to anhydrous ammonia in vapor or liquid form can cause severe injuries to the eyes and lungs including fatalities. Second, when anhydrous ammonia comes in contact with water, it forms the corrosive alkaline ammonium hydroxide. When anhydrous ammonia is applied into the ground, a significant amount can be lost as vapor if the moisture conditions aren't perfect or if the application depth is too high or too low. Third, ammonia kills most bacteria, including the nitrifying bacteria needed in the soil to continue the conversion of the "fixed nitrogen" into a form useable by the plant. Much of the applied nitrogen is at risk of being lost through leeching, runoff from rain, denitrification and so on. Released nitrates in the environment cause substantial damage to waterways and aquifers and can cause everything from birth defects to toxic algae plumes in rivers, streams and oceans. It is well established that the agricultural runoff from the Ohio Basin into the Gulf of Mexico causes the annual "dead zone" in the gulf which in some years is the size of Texas. Phosphorus discharge is one of the greatest issues facing the state of Florida and many other states with high agricultural outputs. **Many states are considering or have enacted legislation to limit synthetic agricultural fertilizers. BioGrow 365 offers a significant hedge against this risk.**



## How BioGrow 365 Works

BioGrow 365 delivers nitrogen to a plant in a completely different way than the synthetic chemicals it competes with. Rather than capturing atmospheric nitrogen and applying it as a solution or granule, it has found a method to isolate, capture and grow nitrifying bacteria once abundant in soils and apply these to the ground or the plant in a liquid solution. These bacteria or “microbes” are able to capture atmospheric and soil-based nitrogen sources and convert them into a form useable by all plant life. Fertilizers alone are incapable of converting organic nitrogen into the mineralized form required. BioGrow 365 also contains solubilizing bacteria which are able to convert phosphorus, potassium and other elements and make them plant available. Unlike other microbes available on the market, the microbiology in BioGrow 365 is unique in that the microbes are able to be held and grown in solution **indefinitely** and a food source and carbon host is provided for the microbes to ensure they survive and multiply profusely when applied to the ground.

***In addition to its nitrifying and solubilizing microbes, BioGrow 365 also sends a complete food and nutrient source available immediately for uptake by the plant along with beneficial microbes.*** The nutrient source is derived from specific poultry manure which is highly composted to ensure the complete elimination of pathogens. An enzyme process is applied to the composted manure to extract the nutrient. There is no manure of any kind in BioGrow 365; only extracted nutrients. ***These nutrients include nitrogen, potassium, calcium, sulphur, carbon, sodium, phosphorus, magnesium, iron, boron, zinc, copper, molybdenum, manganese, cobalt and selenium.*** As such, BioGrow 365 is a full spectrum nutrient, organic fertilizer and soil rejuvenator.

BioGrow may be applied by hand/mechanical/aerial sprayers, drip irrigation, pivots, flood irrigation, and so on. In summary, BioGrow 365 is not a significant source of NPK. Rather, it is a complete food source and microbial mix which uses the unlimited supply of atmospheric and soil based nitrogen plus the full spectrum nutrition contained in BioGrow 365 and converts all of this through microbiology into a form readily available by plants.

## BioGrow 365 Efficacy

In study after study, test after test, crop after crop BioGrow 365 has kept up with and in most cases substantially out-performed the yields produced by synthetic ***fertilizers in the first year of use.*** It generally accomplishes this at a substantial cost saving to the farmer’s fertilizer costs.



## Science Summary

BioGrow 365 is simply in a category unto itself. Comparisons to any organic or synthetic fertilizers currently available in the market are completely inappropriate. It is a complete food source. It acts as a fertilizer; but its nitrogen component is found in nitrifying bacteria, not chemically captured atmospheric nitrogen. It is generally significantly cheaper than synthetic fertilizers. Its microbiology creates healthier and more diverse soils. It increases yields and Brix levels in all plants tested and used on. It is able to capture and convert synthetic fertilizers bound up in soils into plant available food sources. It has no negative consequences in the environment or local ecology; to the contrary it is healthy and helpful to the environment. One Wall Street expert has called BioGrow 365 a “disruptive technology”. We agree that BioGrow 365 is a game changing, next generation nutrient. Although organically certified, most of BioGrow 365's client base is comprised of traditional farmers looking for a significant economic edge.



# Part 2: How Well Does BioGrow 365 Work?



***“I’ve been using BioGrow 365 for 4 years. I started out using it on asparagus and saw good results. From there I went on to alfalfa and it increased my tonnage and TDN. What I noticed on my tomatoes was that at all stages of early planting to cultivation.....from what I’ve seen increases tonnage...from 2012 to 2013 increased my tonnage from....the low 40 tons per acre to 58 to 60 tons per acre.....I truly endorse the product. No matter what crop you use it on you are going to get results...”***

***Source: Leo Arnaudo of Arnaudo Brother’s Farms, one of the most predominant mixed farms in Tracy California.***



## Case Study: Dale Smith of Star Peak Ranch in Nevada



Herewith are independent material test results from 3 of my 130 acre pivots. Each pivot is in 2 – 3 year old alfalfa harvested within one week of each other. The fields named Tyler and Harman is where we applied the EcoBoss16 product. The field named Evert is where we used synthetic (acid, phosphorous, zinc) base fertilizers. There is a marked difference in TDN and protein in the EcoBOSS16 fields VS the conventionally fertilized fields.

(\*Note that EcoBoss16 is the same formula as BioGrow 365, but is not certified as an Organic fertilizer)

### EcoBOSS16 – Independent Analysis –

Star Peak Ranch / Tonnage Comparison for your review:

- **Tyler pivot** 329 bales 230 ton = 1.7 ton per acre at bale weight of 1,400lbs
- **Harman pivot** 387 bales 271 ton = 1.9 ton per acre
- **Evert pivot** 303 bales 212 ton = 1.5 ton per acre

Actual bale weight has been consistently above 1,500lbs since shipping has commenced so actual tonnage is greater. Average tonnage on the EcoBOSS16 fields is 2.06 tons to the acre. On the conventionally fertilized fields the average is 1.5. Also the bounce back factor was noticeable as we would normally be on a 28 day watering cycle the EcoBOSS16 fields we taken at day 22 and 23. Those two fields will be going four cuttings this year. Dale Smith, Career Farmer - 07-12-2012



### # Using Chemical Fertilizers.



**J L ANALYTICAL SERVICES, INC.**

217 Primo Way • Modesto, California 95358 • Office (209) 538-8111 • FAX (209) 538-3966

Star Peak Ranch  
800 Kyle Hot Springs Rd.  
Imlay, NV 89418

Report # L2.2-18R12937  
Report Date: 06/25/2012  
Received Date: 06/25/2012  
Work Order: 269125  
Submitted by:

Laboratory Number: 26912502  
Description: Alfalfa Hay, Evert 1st, 6/25/12

### Certificate of Analysis

Constituent	As Received	90% Dry Basis	100% Dry Basis		Method Reference	Analysis Date
Dry Matter	93.6			%	AOAC 991.01	06/25/2012
Acid Detergent Fiber	30.9	29.7	33.0	%	AOAC 989.03	06/25/2012
Crude Protein (N X 6.25)	15.7	15.1	16.8	%	AOAC 989.03	06/25/2012
Total Digestible Nutrients	53.9	51.8	57.6	%	UCCE 21457 <sup>6</sup>	06/25/2012
Net Energy for Lactation	0.548	0.527	0.586	Mcal/lb	UCCE 21457 <sup>6</sup>	06/25/2012
Potassium	2.3	2.2	2.4	%	NFTA Appendix B	06/25/2012



# Using EcoBOSS16 Soil Conditioner.



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Star Peak Ranch  
800 Kyle Hot Springs Rd.  
Inlay, NV 89418

Report # L2.2-18R12937  
Report Date: 06/25/2012  
Received Date: 06/25/2012  
Work Order: 269125  
Submitted by:

Laboratory Number: 26912501  
Description: Alfalfa Hay, Tyler 1st, 6/25/12

## Certificate of Analysis

Constituent	As Received	90% Dry Basis	100% Dry Basis		Method Reference	Analysis Date
Dry Matter	91.9			%	AOAC 991.01	06/25/2012
Acid Detergent Fiber	27.0	26.5	29.4	%	AOAC 989.03	06/25/2012
Crude Protein (N X 6.25)	17.0	16.6	18.5	%	AOAC 989.03	06/25/2012
Total Digestible Nutrients	55.4	54.3	60.3	%	UCCE 21457 <sup>6</sup>	06/25/2012
Net Energy for Lactation	0.566	0.554	0.616	Mcal/lb	UCCE 21457 <sup>6</sup>	06/25/2012
Potassium	1.9	1.8	2.0	%	NFTA Appendix B	06/25/2012

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Inlay, NV 89418

Report # L2.2-18R12937  
Report Date: 06/25/2012  
Received Date: 06/25/2012  
Work Order: 269125  
Submitted by:


Laboratory Number: 26912503  
Description: Alfalfa Hay, Harman 1st, 6/25/12

## Certificate of Analysis

Constituent	As Received	90% Dry Basis	100% Dry Basis		Method Reference	Analysis Date
Dry Matter	92.3			%	AOAC 991.01	06/25/2012
Acid Detergent Fiber	26.9	26.3	29.2	%	AOAC 989.03	06/25/2012
Crude Protein (N X 6.25)	14.9	14.6	16.2	%	AOAC 989.03	06/25/2012
Total Digestible Nutrients	55.8	54.4	60.5	%	UCCE 21457 <sup>6</sup>	06/25/2012
Net Energy for Lactation	0.57	0.556	0.618	Mcal/lb	UCCE 21457 <sup>6</sup>	06/25/2012
Potassium	2.1	2.0	2.3	%	NFTA Appendix B	06/25/2012

### Notes

6 Calculated from Acid Detergent Value Equations from University of California Extension leaflet 21457

Authorized By:  06/25/2012  
Robert Norred,  
Chemistry Technician





# Specific Benefits of BioGrow 365 on Alfalfa

## 1. Tonnage

Although far from the only consideration, the primary job of any fertilizer is to increase yields, and in the case of alfalfa that measurement is calculated in tons per acre. In the case of Dale Smith's Star Peak Ranch, the fields with the BioGrow 365 formula outperformed those with synthetic fertilizers by .5 tons per cut. With four cuts per year, that is an increase of 2 tons per acre per growing season. It should be noted that Dale Smith is now in his fourth year with BioGrow 365, and his results have been consistent throughout. On a typical 600 acre farm, all things being equal, this equates into an additional \$240,000 in gross revenues if we assume a price of \$200 per ton.

Part of the tonnage equation is found in the favorable "bounce back" time reported by alfalfa growers utilizing the BioGrow 365 formula. Bounce back is an unscientific term applied to the time required by the alfalfa plants to adjust from the stress of harvest back to actively growing. Dale Smith reports being able to utilize a 28-32 day cutting cycle in a zone and elevation where the cycle on average is in the 36-38 day range. This provides him with an extra cut per year as compared to both the state average in his zone and his own previous experience when using NPK and Phosphoric acid fertilizers. Dale also provides his fields with a 2-gallon per acre dose after his final cut. This assists the plants in storing carbohydrate over the winter and gets them growing earlier in the spring. The cumulative impact of the benefits of BioGrow 365 is greater tonnage across the board.

## 2. TDN

Total Digestible Nutrients, or TDN is a key factor in setting the grade of alfalfa. TDN is the sum of all digestible fiber, protein, lipids and carbohydrates in the feed. According to UC Davis's agronomist, Steve Orloff there are four mechanisms which influence forage quality which are: (1) Plant maturity at harvest, (2) leaf percentage, (3) changes in chemical constituents due to the environment grown in, and (4) conditions during harvest. "**Leaf Percentage** as a determinant of forage quality cannot be overemphasized. Leaves have two to three times the protein content of stems." (**Source: *Agronomic practices and Forage Quality, Putnam, Orloff, and Ackerly, UC Davis, 2009***)

Note that in the case study above, the field grown with the farm's normal nutrient program provided a TDN on a 90% Dry Basis of 51.8. The Fields on the same farm in the first year of BioGrow 365 use returned a TDN on a 90% Dry Basis of 54.3 on one and 54.4 on the other.

Tory Friedman of Tory Friedman Farms is another long term (4-year plus) user of BioGrow 365. In terms of the information above regarding the mechanisms that effect TDN, he has a number of interesting and telling observations regarding BioGrow 365. Below is a portion of an interview conducted in September of 2014. For the full video see:

**<https://www.youtube.com/watch?v=jUnRdM339AI>**



***“(Friedman) I think it comes down to the micro-nutrient base. I think it’s been a wrench in the toolbox that we’ve been missing.... (Interviewer) So when you were first introduced to BioGrow 365 did you see it as a total nutrient package...? (Friedman) No...Our initial goal with the product was to basically flocculate the soil and increase the biological component of the soil....With BioGrow 365 what we get to do is increase and set the biology if you will, and back it up with microbiology. It is a complex diet that all synthetics don’t touch. (Interviewer) You were talking to me earlier about lateral versus vertical plant growth. Can you just show us what you’re talking about? .....(Friedman) What we want so that we don’t grow desert hay is we want lateral leaf growth and leaf retention.....by providing BioGrow 365 what we’re getting is good lateral growth....which is important to us because it means tonnage, and the leaves mean sugar....here’s what we know for sure....we are pushing tonnage. We blow the state average out of the water...the stand is healthy...the rebound is, I think this is one of the most important aspects of BioGrow 365, the rebound after the crop stress through harvest, is quite profound.”***

From this excerpt it is clear that BioGrow 365 is able to produce greater TDN by encouraging greater leaf development (horizontal growth) which is accomplished at the cellular level. The full-spectrum micronutrient package and microbiology provided in BioGrow 365 is clearly beneficial, and is simply not available in any synthetic mixture available on the market.

### **3. Fertilizer Application**

The recommended dosage of BioGrow 365 for alfalfa is 8-12 gallons per acre per growing season. If pivot irrigation is used, the BioGrow 365 tote can be parked directly beside the pivot and injected through a chemical pump. A 264 gallon tote provides 2 gallons per acre if the pivot is the standard 130 acres. BioGrow 365 has been filtered twice through the settlement period first with a 100 micron mesh and then a 150 micron mesh and can be used in the finest irrigation drip lines. It will not plug up pivot heads. BioGrow 365 can also be applied by any form of sprayer, drip irrigation, or flood irrigation without harmful runoff.



## Part 3: A Few Final Words



Tory Friedman, Tory Friedman Farms

“What it comes down to is conditioning your soil. In Nevada here we have a really tough soil profile, along with our water which is high in alkaline. What we get to do with BioGrow 365 is to flocculate those soils, open them up, and a lot of times that’s all the plant needs. You can throw a bunch of synthetic on, alright. If your soils aren’t conditioned properly, you’re just going to run it down the street; run it down the road...run it down the pivot track. And that’s the reason I started using it in the first place. Not as a fertilizer, but as a soil rejuvenator. Then, when you find out how the biodiversity works, you realize the (full power of) the product.”

### **If BioGrow 365 works so well, why isn’t everyone using it?**

We give the final word to Dale Smith of Star Peak Ranch:

***“Well, probably like me as an old guy they’re not subject to change, but once I made the change I wondered why it took me so long.”***

