

Farm Name		Overview	
Farm #	107	All soil contains many small, easily-absorbed, plant-available molecules of minerals like Soluble Salts, Trace Minerals, Inorganic Nitrogen (Nitrates), Inorganic Phosphorus (Orthophosphates), and Potassium . Soil has an inherent pH (acid/base balance) that determines how well some of these minerals are absorbed by plant roots.	
Soil Sample #	S21171	Soil also contains Soil Organic Matter , which is where soil microbes live, eat and die. Soil Organic Matter contains Organic Carbon , which microbes eat. Soil Organic Matter also stores Organic Nitrogen and Organic Phosphorus in large complex organic molecules which are not readily plant-available. Soil microbes break down ("mineralize") some of these large organic molecules into small easily-absorbed plant-available molecules of Nitrate and Orthophosphate . As they work, soil microbes exhale CO₂ , measured as Soil Respiration .	
Site Name	Grass between rows A-Z		
Site Characteristics	Irrigated	Zero tillage	Conventional
GPS Coordinates	40.053428 -105.280035		
NRCS Soil Type	Valmont cobbly clay loam, 1 to 5 percent slopes		
Collection date	6/21/21		
Lab Report date	6/28/2021		
Lab Invoice #	MI 1339		
Core Depth	0-6		
Soil Temp	78		
Precip/irrig date	6/20/21	Drought?	no
Recent Tillage date	n/a		
Type tillage	none		
Most recent crop	grass		
Planting date		Termination date	
Recent Amendment	mulch, humic acid, coron 28-0-0		
Application date	6/18/21		
Haney Results Highlights		Results	Explanation
Soil Health Score	27.9	0-50 = Normal National Ranges.(Most < 30) > 7 = a good starting point >10 = Good for most soils 2-15 = Normal Colorado Ranges	Your Soil Health Score represents the overall health of your soil system. Tracking your Soil Health Score over time allows you to gauge the effects of your management. In Colorado, a score greater than 18 is rarely attainable. Colorado soils are limited by soil pH , soil texture, and annual precipitation. Compare your soil health score to others nearby to set realistic goals for what you can achieve.
Cover Crop Suggestion	20% Legume 80% Grass		Your suggested Cover Crop Mix is designed to provide your soil with a multi-species cover crop to improve soil health and fertility. The percentage of grass to legumes/brassiccas is based on your Water Extractable Organic Carbon : Water-Extractable-Organic Nitrogen Ratio, Soil Respiration, and Soil Health Score (on pages 4, 2, 1.)
Nutrient quantity available in your soil for the next crop			
Nitrogen available for next crop	59.11	lbs. N/acre	This value includes your Inorganic Nitrogen PLUS the Nitrogen expected to be released by soil microbes. (Lbs. of Nitrogen = (NO₃ ppm + NH₄ ppm + Org. N Release ppm) * 0.3 * Depth of sample in inches)
Phosphorus available for next crop	34.71	lbs. P ₂ O ₅ /acre	This value includes the Inorganic Phosphorus (Orthophosphate) PLUS the Phosphorus expected to be released by soil microbes. (Lbs. of Phosphorus = (PO₄ ppm + Org. P Release ppm) * 2.3)
Potassium available for next crop	186.49	lbs. K ₂ O/acre	This is the pounds of plant-available Potassium (K₂O) already in one acre of your soil. Potassium levels are naturally adequate in most Colorado soils. (Lbs. of Potassium = (Potassium ppm) * 1.2)
Nutrient Value	\$144.62	\$/acre	This is the price of nutrients currently in your soil. It is calculated as (Current Fertilizer Prices) x (lbs./acre of N + P + K currently in soil).
Traditional Nitrogen Evaluation	30.78	lbs. Nitrogen/acre	This is the Lbs./ acre of Nitrogen in your soil that would have been measured using a traditional soil test where Nitrate (NO₃) was the only test used.
Haney Test Nitrogen Evaluation	59.11	lbs. Nitrogen/acre	This is the Lbs./acre of Nitrogen in your soil measured with the Haney Test.
Nitrogen Difference	28.33	lbs. Nitrogen/acre	This is the difference in the amount of Nitrogen in your soil using the Haney Test compared to the traditional Nitrate (NO₃) testing method. This value increases with better soil health.
Nitrogen Savings	\$18.13	/acre	This is the \$/acre saved when using the Haney Test to calculate fertilizer application rates, compared to traditional soil testing methods measuring only Nitrate (NO₃) .

Questions about your results? Call/email Lance Gunderson: lance.gunderson@regenaglab.com (308) 440-1681

Test	Results	Normal Ranges	Explanation
	Good		
	Average		
	Concerning		
pH	6.8	<p><5.5-Strongly acidic</p> <p>5.5-6.2-Moderately acidic</p> <p>6.2-7.0-Optimal for most crops</p> <p>7.0-7.7-Moderately alkaline</p> <p>>7.7-Strongly alkaline</p>	<p>pH is a measurement of how acidic or alkaline the soil is. It controls how available nutrients are to crops. If pH is too high (alkaline), phosphorous, iron, manganese, copper and boron become unavailable to the crops. If pH is too low (acidic), calcium, magnesium, phosphorous, potassium and molybdenum become unavailable. Most Colorado soils are alkaline, with a pH between 7.2 and 8.3. Amending soil with Sulfur (S) can lower soil pH.</p>
Soluble Salts 1:1 mmho/cm	0.17	<p>0-1.2 - Non-saline. Satisfactory for crops.</p> <p>1.2-2.5 - Slightly saline.</p> <p>2.5-5 - Moderately saline.</p> <p>5-9 - Strongly saline. High for many crops.</p> <p>>9 - Very strongly saline</p>	<p>Soluble Salts are easily dissolve-able compounds of sodium, potassium, calcium and other minerals. High levels of Soluble Salts can hurt plant root growth and microbial function. Crops vary a lot in their tolerance to Soluble Salts, so your values must be interpreted in relation to the specific crop you want to grow. Common causes of high Soluble Salts are poor drainage and manure or irrigation water high in salt.</p>
Excess Lime	HIGH	None, Low or High	<p>Excess Lime in the soil helps buffer against pH changes due to fertilizer additions and biological activity. It is used to determine whether Sulfur (S) will be an effective amendment in sodium reclamation.</p>
Sulfur ppm S	5.81	<p>5 - 20 - Desired for most crops.</p> <p>At least 20 adequate for most crops</p>	<p>Sulfur is a major plant nutrient that is mainly derived from organic matter decay in the soil. Deficiency symptoms include stunting, plant yellowing, and thinning of stems.</p>
Calcium ppm Ca	812.56	<p>250-5000 ppm has no apparent deficiency or excess in plants.</p>	<p>Calcium varies a lot in Eastern Colorado, but is usually never deficient. Calcium present as calcium carbonate has an influence on pH.</p>
Soil Organic Matter %LOI, SOM	6.3	<p>0.5-3.0% - Normal ranges for Eastern Colorado</p>	<p>Soil Organic Matter (SOM) is the percent of your soil that contains large complex carbon-based organic molecules made from living things. SOM is the "house" that soil microbes live in. SOM helps form stable soil aggregates and improves the water-holding capacity of your soil. SOM contains about 95% of all soil Nitrogen (N), and provides a slow release of nutrients. Each 1% of SOM present will release about 30lbs of Nitrogen(N) per acre during the cropping season (slower release rates at higher elevations).</p>
Water Extractable Organic Carbon (WEOC) ppm C	165.22	<p>100-300 ppm - Normal range</p> <p>The higher the number the better.</p>	<p>Water Extractable Organic Carbon is the small portion (about 1.25%) of your Soil Organic Matter (SOM) that your soil microbes can easily feed on. Soil Organic Matter (SOM) is the house that microbes live in, but Water Extractable Organic Carbon is the food they eat. Water Extractable Organic Carbon tends to respond to changes in management sooner than Soil Organic Matter (SOM). Manure, compost or cover crops can raise your Water Extractable Organic Carbon levels.</p>
Soil Respiration CO ₂ -C ppm C	370.23	<p>0-10 - Very Low</p> <p>11-20 - Low</p> <p>21-30 - Below average</p> <p>31-50 - Slightly below average</p> <p>51-70 - Slightly above average</p> <p>71-100 - Above Average</p> <p>101-200 - High</p> <p>201+ - Very High</p>	<p>Soil Respiration measures the CO₂ released in 24 hours by your soil microbes, and reflects the abundance and activity of your soil microbes. In general the higher the number the better. Soil microbes produce Carbon Dioxide (CO₂), as they break down plant residues in the soil and turn large complex organic molecules into plant-available forms. Soil Respiration is influenced by Soil Organic Matter (SOM), soil texture, overall fertility, soil type and climate. Sandier soils and dryer climates tend to score lower. Focus on the relative differences between samples and changes in this number over time in response to management, rather than on the number itself.</p>
Carbon Calculations	Results	Normal Ranges	Explanation
Microbially Active Carbon %MAC	224.09	<p>50% - 75% is ideal for most production systems.</p>	<p>Microbially Active Carbon represents how much of your Water Extractable Organic Carbon was acted upon by your soil microbes. It is calculated as Soil Respiration ÷ Water Extractable Organic Carbon (values above). <25% - Water Extractable Organic Carbon is probably not limiting your Soil Respiration. Rather the soil's fertility, cold temperatures or drought may be limiting your soil microbes. 50% - 75% - The soil has a good balance of fertility and Water Extractable Organic Carbon. > 80% - Water Extractable Organic Carbon could limit microbial respiration soon, and you should consider adding more carbon to your soil.</p>

Nitrogen		N, P, K and trace values below are NOT comparable to values on traditional soil tests, because of the use of the Water and H3A Extractants.	
Total Nitrogen ppm N	33.5	The desired Total Nitrogen depends on the crop, time of year and how much of the Total Nitrogen is made up of Nitrate (NO₃) and Ammonium (NH₄) .	The Nitrogen in your soil is found in one of two forms: Inorganic or Organic . <ul style="list-style-type: none"> Inorganic Nitrogen is made up of small highly soluble molecules that easily cross cell membranes, and so are immediately available to your plant. Nitrate (NO₃) and Ammonium (NH₄) are the most common forms of Inorganic Nitrogen, and are commonly found in chemical fertilizers. However, Inorganic Nitrogen is also made by soil microbes breaking down ("mineralizing") large organic molecules of Organic Nitrogen into Nitrate (NO₃) and Ammonium (NH₄). Organic Nitrogen is made up of large complex molecules (amino acids, proteins, DNA) that do not easily cross cell membranes, and so are not readily plant-available. Most Organic Nitrogen is stably and tightly bound in Soil Organic Matter (SOM), with nearly 1000 lbs./acre of Organic Nitrogen for every 1% of SOM. Soil microbes have a hard time accessing most of this tightly bound Organic Nitrogen. However, some Organic Nitrogen is in transition from decaying material and has not yet been bound tightly in SOM. This is your Water-Extractable-Organic Nitrogen, AKA WEON.
Water-Extractable-Organic Nitrogen or WEON ppm N	14.59	5 to 100 ppm - Normal range 10 and 30 ppm - Range for most soils. Better if value is higher, if it is balanced with Water Extractable Organic Carbon . Best if most of Total Nitrogen (value above) in this form (WEON).	Water-Extractable-Organic Nitrogen is the small soluble fraction of your total Organic Nitrogen that is easily broken down, or "mineralized" by soil microbes and made available to your growing plants. Because Water-Extractable-Organic Nitrogen is made up of large molecules like proteins, it is not easily lost from your soil system by leaching or volatilizing. Soil microbes break Water-Extractable-Organic Nitrogen down into Inorganic Nitrogen forms (Nitrate (NO₃) + Ammonium (NH₄)) which are plant available. 30 ppm of Water-Extractable-Organic Nitrogen is equal to nearly 60 lbs. of Nitrogen fertilizer to the acre at a 6-inch sample
Inorganic Nitrogen ppm N	18.25	<5ppm during dormant season >5 ppm OK during growing season depending on crop.	Inorganic Nitrogen is the combined amount of plant available Nitrogen in the form of Nitrate (NO₃) and Ammonium (NH₄) , (2 values below, added together).
Nitrate or NO₃-N ppm N	17.1		Most of the Inorganic Nitrogen in your soil is in the Nitrate (NO₃) form. Nitrate (NO₃) is a small, soluble molecule which is easily absorbed by plants' roots. However, Nitrate (NO₃) is also easily lost from soil through surface runoff, subsurface leaching and erosion. In water logged conditions it can revert back to a gas and volatilize. If your Nitrate (NO₃) levels are high (above 50 lb./ac), consider using grasses to convert this easily lost form of Nitrogen back to Organic Nitrogen , which is more stable.
Ammonium or NH ₄ -N ppm N	1.15		Ammonium (NH₄) is a form of Inorganic Nitrogen which usually is quickly converted to Nitrate (NO₃) by soil microbes. It is less susceptible to leaching than Nitrate (NO₃) .
Nitrogen Calculations	Results	Normal Ranges	Explanation
Water-Extractable-Organic Nitrogen : Inorganic Nitrogen	0.77	<2 - Very Low >5 - Best	The ratio of Water-Extractable-Organic Nitrogen to Inorganic Nitrogen in your soil reveals how dependent your soil is on fertilizer inputs. Fertilizer dependent soils often have a ratio <1. Microbes can use Inorganic Nitrogen fertilizers, but if that is their only source of Nitrogen , they steal it from your growing crop. Building up your Water-Extractable-Organic Nitrogen with crop rotations, livestock and cover crops maximizes the efficient use of fertilizers by microbes and your crop.
Organic Nitrogen Release ppm N	14.59	The higher the better, but this will never be greater than your Water-Extractable-Organic Nitrogen number	Organic Nitrogen Release is the total amount of Nitrogen that will be released from your Water-Extractable-Organic Nitrogen pool through microbial activity. Organic Nitrogen Release increases as your soil system gets healthier. It is counted as a credit to your next crop and is subtracted from the recommended Nitrogen needed to produce your next crop (if you provided crop and yield goals.)
Organic Nitrogen Reserve ppm N	0	0: Increase Water-Extractable-Organic Nitrogen to get larger credit next year. >0: Increase Soil Respiration or balance Water Extractable Organic Carbon to Water-Extractable-Organic Nitrogen Ratio . Get more credit next year.	The Organic Nitrogen Reserve is how much of your Water-Extractable-Organic Nitrogen pool is left after soil microbes use up the Organic Nitrogen Release (value above). (Organic Nitrogen Reserve = Water-Extractable-Organic Nitrogen - Organic Nitrogen Release .) Your soil is constantly refilling the Organic Nitrogen Reserve by breaking down plant residues, manure, compost, and dead soil microbes. Addition of fresh residue helps this process.

C : N Calculation	Results	Normal Ranges	Explanation
Water Extractable Organic Carbon to Water-Extractable-Organic Nitrogen Ratio	11.32	<p><8:1 - Poor. Increase carbon inputs; graze shorter to retain carbon</p> <p>8:1 - 15:1 - Good. Make slight adjustments to keep within this range</p> <p>10:1 - 12:1 - Ideal. Increase intensity to drive both Water Extractable Organic Carbon and Water-Extractable Organic Nitrogen up together to increase biologic activity</p> <p>15:1 - 20:1 - Marginal. Increase legumes or covers; reduce high carbon inputs; graze longer to reduce carbon</p> <p>>20:1 - Poor, Increase legumes/covers; reduce high carbon inputs; graze longer</p>	<p>Water Extractable Organic Carbon to Water-Extractable-Organic Nitrogen Ratio is Haney's version of a Carbon: Nitrogen Ratio. This Ratio is not the same as the total Carbon: Nitrogen Ratio of your soil, manure or cover crop. Haney's Water Extractable Organic Carbon to Water-Extractable-Organic Nitrogen Ratio compares the transitional fractions of Carbon and Nitrogen that are not yet tightly bound in Soil Organic Matter (SOM).</p> <p>If the Water Extractable Organic Carbon to Water-Extractable-Organic Nitrogen Ratio is below 8:1, it means there is not enough Carbon for microbes to eat, and they do not have enough energy to turn transitional forms of Nitrogen and Phosphorus into plant-available forms. As the Water Extractable Organic Carbon to Water-Extractable-Organic Nitrogen Ratio increases and Carbon is added to the system, soil microbes prosper, and turn transitional Nitrogen and Phosphorus into plant-available forms which benefit your crops. But if the Water Extractable Organic Carbon to Water-Extractable-Organic Nitrogen Ratio rises above 20:1, it means there is lots of Carbon for microbes to eat, but very little Nitrogen. Soil microbes will use all the available transitional Nitrogen and Phosphorus themselves, and will not make extra nutrients available for your plants. Nitrogen and Phosphorus are "tied up" in this case.</p>
Phosphorus	Values below are NOT comparable to traditional soil tests, because Haney uses Water and H3A extractants.		
Total Phosphorus ppm P	15.09	25 to 60 for most production systems.	Total Phosphorus (P) is the sum of Inorganic and Water-Extractable-Organic Phosphorus (values below). Phosphorus is an essential plant nutrient, used by plant cells to build DNA and regulate metabolic reactions. At high levels, Phosphorus can pollute waterways and at very high levels it interferes with plant uptake of iron and zinc. Optimal values for Phosphorus vary, depending on individual soil type, a realistic yield goal and demand by a given crop. A Total Phosphorus value of 15 ppm may produce a 'healthy' 100 bushel corn crop. However, if the field has a greater yield potential, you would want a Total Phosphorus value of 25-40 ppm to produce a 'healthy' 250 or 300 bushel corn crop.
Inorganic Phosphorus ppm P	10.6	>20 and <50 for most production systems.	Inorganic Phosphorus (or Orthophosphate (PO₄)) is the easily absorbed plant-available form of Phosphorus . Desired levels depend on the crop grown and expected yield goal.
Water-Extractable-Organic Phosphorus ppm P	4.49	<10 = Normal range unless Total Phosphorus >100ppm. The higher the better.	Water-Extractable-Organic Phosphorus is the fraction of Organic Phosphorus that is not currently plant available but may be made available by soil microbes. Most of the Organic Phosphorus found in the soil is stable and tied up in SOM , but a relatively small fraction of this Organic Phosphorus is soluble. This soluble Organic Phosphorus is the fraction being measured as Water-Extractable-Organic Phosphorus in the Haney Test. The actual total Organic Phosphorus would be much higher if it were measured with traditional soil
Phos. Calculations	Results	Normal Ranges	Explanation
Organic Phosphorus Release ppm P	4.49	The higher the better, but this will never be greater than your Water-Extractable-Organic Phosphorus number.	Organic Phosphorus Release is the amount of Phosphorus that will be released from your Water-Extractable-Organic Phosphorus pool through microbial activity. The Organic Phosphorus Release is dependent on how much Water-Extractable-Organic Phosphorus you have, how high your Soil Respiration is, and how balanced your Water Extractable Organic Carbon: Water-Extractable-Organic Nitrogen Ratio is.
Organic Phos. Reserve ppm P	0	0 or more. See ->	The Organic Phosphorus Reserve is how much of your Water-Extractable-Organic Phosphorus pool is left after soil microbes use up the Organic Phosphorus Release (value above). (Organic Phosphorus Reserve = Water-Extractable-Organic Phosphorus -- Organic Phosphorus Release.) Similar to Organic Nitrogen Reserve
Trace	Values below are NOT comparable to traditional soil tests, because Haney uses Water and H3A extractants.		
Potassium ppm K	155.41	<p>0-20 - 20-50% sufficiency</p> <p>21-40 - 45-80% sufficiency</p> <p>41-60 - 70-95% sufficiency</p> <p>61-100 - 90-100% sufficiency</p>	Potassium is an essential plant nutrient that helps with heat and cold tolerance and promotes fruit development. Potassium levels are adequate to high in most Colorado soils, especially with annual applications of compost or manure. Deficiencies occasionally occur in soil with low organic matter and in sandy soils.

Zinc ppm Zn	1.51	0.5+ adequate for all crops, depending on pH and crop.	Zinc levels increase with soil organic matter and decrease with higher pH and with excess Phosphorus. Zinc deficient plants have small leaves and shortened internodes.
Iron ppm Fe	65.19	20. + adequate for all crops	All soils have plenty of Iron, but a high soil pH (alkaline soil) can make the Iron unavailable to plants. Iron is essential for chlorophyll formation, respiration and photosynthesis. Plants deficient in Iron develop chlorosis.
Manganese ppm Mn	2.26	1.5 + adequate for all crops	Manganese and Iron are closely associated. Manganese is required for respiration and photosynthesis. New leaves are the first part of the plant to show deficiency symptoms.
Copper ppm Cu	0.22	.05 + adequate for all crops	Copper is part of the transport system in photosynthesis. Copper deficiency interrupts protein synthesis, disrupting growth and causing dieback.
Magnesium ppm Mg	200.39	100+ adequate for all crops	Magnesium is adequate in finer textured soils of semi arid regions. Deficiency symptoms are interveinal chlorosis in older leaves, progressing to younger ones.
Sodium ppm Na	13.79	< 200 ppm	Use this value to see if Sodium may be a potential problem. Excess Sodium can cause soil to be hard and cloddy when dry, to crust badly, and to take water very slowly.
Aluminum ppm Al	84.78	There is no defined desired range for Aluminum using the Haney Test.	Aluminum toxicity may be a problem when soil pH values are at 5.5 or below (strongly acidic), depending on the crop being grown. Colorado soils are generally alkaline, so this is usually not a problem here.
PLFA RESULTS: Test	Results	Normal Ranges	Explanation
	Good		
	Average		
	Concerning		
Total Microbial Biomass PLFA ng/g	7620.74	<500 - 1000 - Very Poor to Poor 1000 - 3000 - Below Average to Above Average 3000 - 4000+ - Good to Excellent	This number represents the total microbial life in your soil. pH, temperature, moisture, soil type, Soil Organic Matter, intensity/type of tillage, crop rotations, cover crops, and herbicide or pesticide applications will all change this number. There is no baseline "normal range" for biological testing like there is for chemical analysis. The PLFA is most useful for comparing different management over time.
Functional Group Diversity Index	1.401	<1.0 - 1.1 - Very Poor to Poor 1.1 - 1.4 - Below Average to Above Average 1.4 - 1.6+ - Good to Excellent	This number represents how many different classes of microbes are found in your soil. The higher the number, the more varied your microbial community is, and the better your soil health is. However, the "normal ranges" listed here are based on soil tests from all over the US, and may be different for Colorado's Front Range.
Total Bacteria	4067.19	This number represents all the different kinds of bacteria in your soil. Bacteria are the smallest, most plentiful and hardiest microbes in your soil. They can survive under harsh conditions like tillage. However, as single-celled organisms, they need a film of water to survive. When conditions are ideal, Bacteria reproduce in 30 minutes, and have a short life span. Bacteria contain a lot of Nitrogen because they are the first microbes to digest new organic residues in the soil. When bacteria die, the Nitrogen in their cells is released to the soil in plant-available forms. Bacteria are like little bags of fertilizer that power your soil nutrient cycle.	
	53.37%		
Gram(+) Bacteria	2035.41	Gram(+) bacteria are larger, have thicker cell walls, and tend to resist water stress better than Gram(-) bacteria. The Gram(+)/Gram (-) classification of bacteria was invented as a way to differentiate different kinds of disease carrying bacteria for medical purposes. Gram(+) bacteria absorb a particular stain and look purple under a microscope. Gram(-) bacteria do NOT absorb the stain and appear clear. Gram(+) and Gram(-) does NOT indicate pathogens versus beneficials in your soil.	
	26.71%		
Actinomycetes (Gram(+) Bacteria)	764.52	Actinomycetes are a group of Gram (+) bacteria that act a lot like fungi. They extend thread-like filaments out into the soil, form spores and break down woody plant residue like fungi do. They secrete natural antibiotics, which fight off pathogens and become part of a crop's "immune system." Actinomycetes are active at high pH levels like we have in Colorado. They form nitrogen-fixing relationships with over 200 species of plants, and can degrade and neutralize pollution-causing chemicals.	
	10.03%		
Gram(-) Bacteria	1267.25	This number represents all the Gram(-) bacteria in your soil. Gram(-) bacteria are smaller, and tend to be more stressed by drought.	
	16.63%		
Total Fungi	693.94	Fungi are rapid-growing multi-celled organisms that need a constant food source. They form symbiotic relationships with plants, by tapping directly into a plant's roots for food. In exchange, Fungi send hyphae, or threads, many feet out into the soil to gather and transport water and nutrients back to the plant. They prefer slightly acidic, low disturbance soils, and high carbon residues. They are not as hardy as bacteria, and decline with conventional tillage. Fungi are better at storing Carbon than Nitrogen in the soil.	
	9.11%		

Arbuscular Mycorrhizal Fungi	357.1	Arbuscular Mycorrhizal Fungi penetrate plant roots to feed directly from them. In exchange, they help plants capture water and nutrients such as Sulfur , Nitrogen , micronutrients, and especially Phosphorus . Arbuscular Mycorrhizal Fungi colonize 80% of vascular plant families. However, this fungi does not colonize members of the mustard family (brassicas). Many commercial soil inoculants contain Arbuscular Mycorrhizal Fungi . Do not apply these innoculants to bare soil as these fungi need a living root to survive.
	4.69%	
Saprophytes (Fungi)	336.84	Saprophytes are decomposers, feeding on dead and decaying organic matter. They decompose woody plant material like cellulose and lignin, by sending mycelia or threads into the material. Some of the by-products of this decomposition turn to humus and remain in the soil for centuries. Some saprophytes also form mushrooms.
	4.42%	
Protozoa (Predator)	7.7	Protozoa are predators and graze on bacteria. Bacteria contain far more Nitrogen than Protozoa need, so Protozoa release the extra Nitrogen as Ammonium (NH4-N) , a highly soluble plant-available form of Nitrogen . So Protozoa are essentially teeny fertilizer factories.
	0.10%	
Undifferentiated	2851.91	This number represents soil microbes that cannot be categorized. 90% of soil microbes have not yet been identified. Scientists don't know what most of them do or how to culture many of them. Some microbes seem to change their DNA in the lab, morphing from one kind of organism to another, an action that makes them doubly difficult to categorize.
	37.42%	
Community Composition Ratios		
	Normal Ranges	Explanation
Fungi : Bacteria	0.1706	<p><0.05 - Very Poor</p> <p>0.05-0.1 - Poor</p> <p>0.1-0.15 - Below average</p> <p>0.15-0.2 - Average</p> <p>0.2-0.25 - Above average</p> <p>0.25-0.3 - Good</p> <p>0.3-0.35 - Very good</p> <p>>0.35 - Excellent</p> <p>This is the ratio of Fungi to Bacteria in your soil. Bacteria are important and needed, but Fungi are desired and usually indicate good soil health. Cover crops, organic inputs and less tilling will help your soil support more Fungi.</p> <p>Forests tend to have fungal-dominated soils. Highly productive agricultural soils tend to have higher ratios of Fungi to Bacteria. Grasslands and agricultural soils usually have bacterial-dominated soils.</p> <p>Bacteria dominate in early spring or late fall, in systems with fewer organic inputs, under dry conditions, in alkaline soils, and after tillage, grazing or compaction of soil.</p>
Predator : Prey	0.0019	<p>< 0.002 - 0.005 - Very Poor to Poor</p> <p>0.005 - 0.013 - Below Average to Above Average</p> <p>0.013- >0.02 - Good to Excellent</p> <p>This number represents the ratio of Protozoa to Bacteria in your soil. Protozoa feeding on Bacteria release nutrients, especially Nitrogen into your soil. A higher ratio means your soil is healthy and has enough nutrients and microbes to support large numbers of predators. However, the prey (Bacteria) will always greatly outnumber the predators.</p>
Gram(+) : Gram(-)	2.2095	<p><1.0 - Gram(-) dominated</p> <p>1.0 - 2.0 - Desired Range</p> <p>>2.0 - Gram(+) dominated</p> <p>This number represents the ratio of Gram(+) to Gram(-) Bacteria in your soil. Gram(+) Bacteria dominate as soil is coming out of dormancy, or during droughts or extreme temperatures. This ratio changes though the growing season, becoming more balanced as growing conditions improve. Gram(-) dominated soil may be due to water-logged soil, pesticides or heavy metals.</p>
Stress and Community Activity		
	Normal Ranges	Explanation
Saturated : Unsaturated Fatty Acids	2.1464	<p>< 1.0 : More stressed microbes</p> <p>> 1.0 : Healthier and more stable microbes.</p> <p>The higher the number, the better.</p> <p>This is the ratio of Saturated Fatty Acids to Unsaturated Fatty Acids in your soil. When Bacteria are stressed, they change the proportions of Saturated and Unsaturated Fatty Acids in their cell walls. A higher number means Bacteria are better adapted to current conditions; conditions are stable and conducive to life. A lower number means Bacteria are stressed, usually from low soil moisture or big temperature swings.</p>
Mono-Unsaturated : Poly-Unsaturated Fatty Acids	58.9479	<p>> 4.0 - Desired Range</p> <p>Higher number: less stress</p> <p>Lower number: more stress</p> <p>This is the ratio of Mono-Unsaturated Fatty Acids to Poly-Unsaturated Fatty Acids in soil. This ratio is used along with the Saturated: Unsaturated Ratio above to assess stress levels of soil microbes. Common stressors are temperature, moisture, pH, or starvation.</p>
Pre 16:1w7c:cy17:0	None Found	<p>All Pre 16 or Pre 18- Active Growth phase</p> <p>> 5.0 Pre 16 or Pre 18 - Active Growth Phase</p> <p>< 5.0 Pre 16 or Pre 18 - Slowing growth</p> <p>All Cyc 17 or Cyc 19 - Very slow/latent growth phase</p> <p>These two values represent the ratios of Precursor-Fatty-Acids to Cyclo-Fatty-Acids in your soil. There are more Precursor-Fatty-Acids when microbes are actively growing and reproducing. There are more Cyclo-Fatty-Acids during periods of low growth or high stress (temperature, moisture, pH, or starvation). At planting time when microbes are becoming active and experiencing fast growth, values are higher. Values usually drop towards the end of the growing season (harvest).</p>
Pre 18:1w7c:cy19:0	32.7614	<p>None Found - Can't detect. Don't worry.</p>