



CROP
Grape



GROWER
Bitner Vineyards



FARM
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FIELD
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SAMPLING DATES
09/13/2024

Sample Name	Sample Date	Tags	Crop	Bacterial Diversity	Denitrification Potential	Nitrate Ammonification Potential	Nitrification Potential	Oxygen Availability	Phosphorus Mineralization Potential	Phosphorus Solubilization Potential
Treated	09/13/24		Grape	787.57	0.25	0.12	0.01	76.0	0.6	0.98
Untreated	09/13/24		Grape	678.22	0.25	0.08	0.01	77.44	0.63	0.79

* All measurements are unitless

Legend	Grape	<596.41	>0.51	<0.11	>0.01	<75.19	<0.49	<1.13
		>690.58	< 0.45	>0.17	< 0.01	>78.05	>0.59	>1.27

Indicator	Definition
Bacterial Diversity	• Accounts for the number of species present as well as the relative abundance of each species. • Unitless value. • Both bacteria and archaea (another type of single-celled organism) are included. • Generally, a higher diversity measurement indicates a more healthy soil. • Bacterial diversity is expected to be higher at moderate soil pH (not very acidic nor very alkaline) and in soils that experience minimal disturbances, such as no-till. Bacterial diversity also tends to increase with decreasing soil moisture content.
Denitrification Potential	Nitrate (NO_3^-) → Dinitrogen/Nitrous Oxide ($\text{N}_2/\text{N}_2\text{O}$) • Represents the abundance of genes responsible for transforming nitrate into nitrogen gasses, which are lost to the atmosphere. • This form of loss mainly occurs in waterlogged soils with low oxygen levels. • A lower value is more beneficial.
Nitrate Ammonification Potential	Nitrate (NO_3^-) → Ammonium (NH_4^+) • Represents the abundance of genes in a sample responsible for converting nitrate to ammonium. • This process is also known as Dissimilatory Nitrate Reduction to Ammonium (DNRA). • A higher value is beneficial, as ammonium is more stable in the soil than nitrate. • This process can contribute to nitrogen retention by counteracting nitrogen loss from leaching or denitrification, particularly under low oxygen conditions and at higher soil pH.

Indicator	Definition
Nitrification Potential	• Nitrifiers are soil microorganisms that are known to increase nitrate in soil. • This value is a sum of all nitrifiers identified in a sample. • A lower number is better for stable nitrogen levels.
Oxygen Availability	• Reflects the oxygen status of the soil by quantifying the number of microorganisms that can grow under low oxygen levels. • This gives insight into the porosity and waterlogging of soil and contributes to the interpretation of other microbial indicators that occur under low oxygen, such as denitrification.
Phosphorus Mineralization Potential	Organic Phosphorus → Phosphate (PO_4^{3-}) • Represents the abundance of genes that release available phosphorus from inaccessible organic forms. • Allows phosphorus that is stored in soil organic matter to be added to the plant-available pool. • A higher value is more beneficial.

Indicator	Definition
Phosphorus Solubilization Potential	Mineral-Bound, Non-Labile Phosphate (PO_4^{3-}) → Plant-Available Phosphate (PO_4^{3-}) • Represents the abundance of genes that are involved in the process of liberating phosphate bound to soil minerals. • Allows previously plant-unavailable phosphorus to be added to the plant-available pool. • A higher value is more beneficial.