



Put the Heartbeat Back into Your Soil™

## ANALYSIS OF GLYPHOSATE LEVELS IN SOIL AND GRAPES TREATED WITH PALEOPOWER

PETERSEN VINEYARD, SEBASTOPOL, SONOMA COUNTY, CALIFORNIA - 2023  
GROWING SEASON

### Introduction

Glyphosate is the active ingredient in herbicides like Roundup. While Glyphosate is an effective herbicide, it has negative impacts on beneficial soil bacteria and fungi which are essential for decomposition, nutrient cycling, disease suppression, plant growth promotion, soil structure formation, and overall soil health. Disruption of these microbial communities can reduce nutrient availability, heighten susceptibility to diseases, and decrease soil fertility.

Glyphosate has been detected in a broad range of foods and beverages, including wine\*, raising health concerns among consumers. Studies suggest that glyphosate's disruption of soil microbial communities may reduce levels of antioxidants and vitamins, adversely impacting the nutritional profile of crops\*\*.

### PaleoPower

PaleoPower is a soil and plant probiotic comprised of a guild of 8 beneficial bacteria designed to improve plant and soil health, and importantly, to degrade glyphosate residue in soil.

### Study Site and Study Design

A 1.5-acre Pinot Noir vineyard in Sonoma County had been regularly treated with RoundUp for over 30 years. The winegrower reported an increasing decline in the overall health and productivity of his vines. PaleoPower was applied during the 2023 growing season, with the goals of improving soil and vine health and reducing glyphosate residues in the soil and grapes. 75% of the vineyard was treated with PaleoPower and 25% was the untreated control.

PaleoPower was mixed with water and applied at a rate of 15 gallons per acre in March 2023 and June 2023. Soil samples were collected prior to the application of PaleoPower in March 2023, again in June 2023 and post-harvest in November 2023. Soil samples were sent to Health Research Institute (HRI) for glyphosate analysis and to EzBiome, Inc. (EzBiome) for soil microbiome analysis. Fruit samples were collected from treated and untreated vines and submitted to HRI to assess glyphosate levels in the grapes.

### Results

#### *PaleoPower Reduced Glyphosate Levels In Soil and Fruit*

Soil samples were analyzed for glyphosate and AMPA by liquid chromatography by HRI according to standard operating procedures and reported as Effective Glyphosate. Per the Food and Agriculture Organization (FAO), total or effective, glyphosate residues are calculated as the sum of the weight of glyphosate plus 1.5 times the weight of its metabolite AMPA. See analysis below:

*Effective Glyphosate Levels of Soils and Plant Tissue Before and After Treatment with PaleoPower*

	CONTROL SOIL		PALEOPOWER TREATED SOIL				GRAPE TISSUE	
Sampling Site	Row 21		Row 4		Row 10		Row 21/Row 10	
Sampling date - 2023	April	October	April	October	April	October	April	October
Effective glyphosate ng/g	314.3	299.1	385.9	15.63	35.99	7.76	3.96	0.96
Percent Reduction	4.84%		95.95%		78.44%		75.76%	



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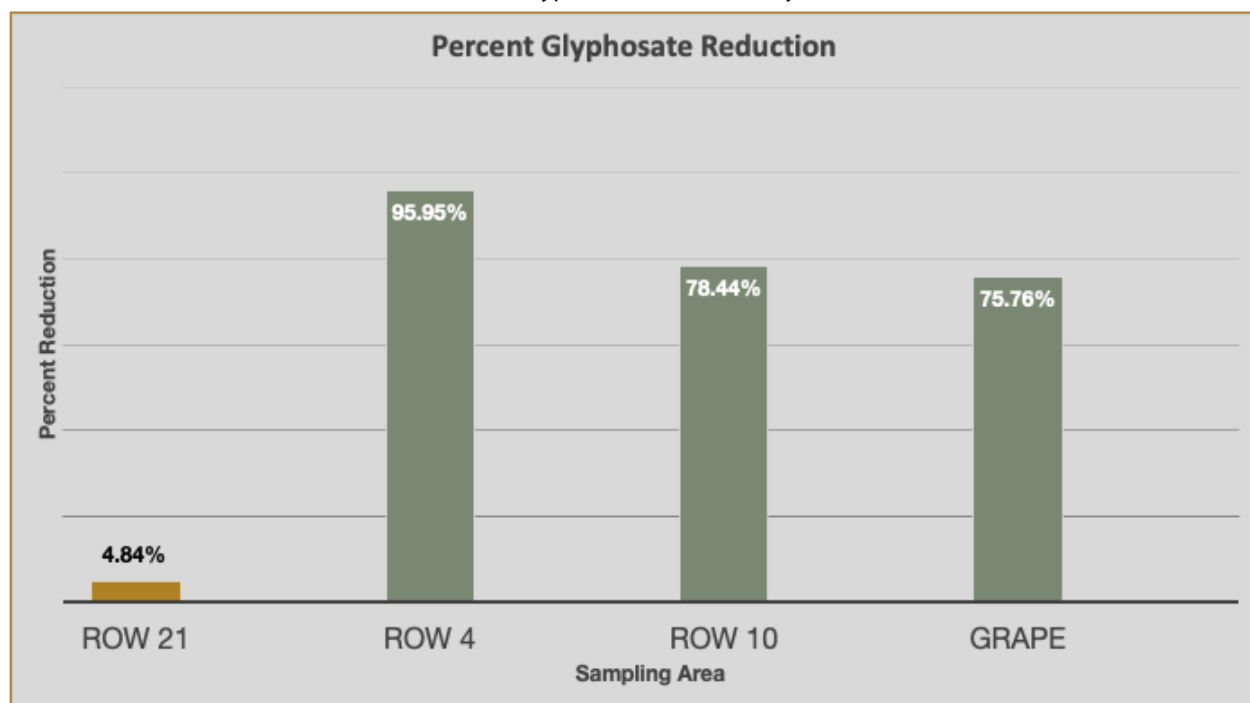
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- **Soil.** Effective glyphosate levels in soils treated with PaleoPower (Row 4 and Row 10) were reduced by an average of 87.2% between March 2023 and November 2023. Conversely, Effective glyphosate levels in the untreated control (Row 21) was reduced by an average of 4.84%.
- **Fruit.** Glyphosate levels in grapes from the PaleoPower treated vines was an average 75.8% lower than grapes from the untreated vines.. These results are illustrated below:

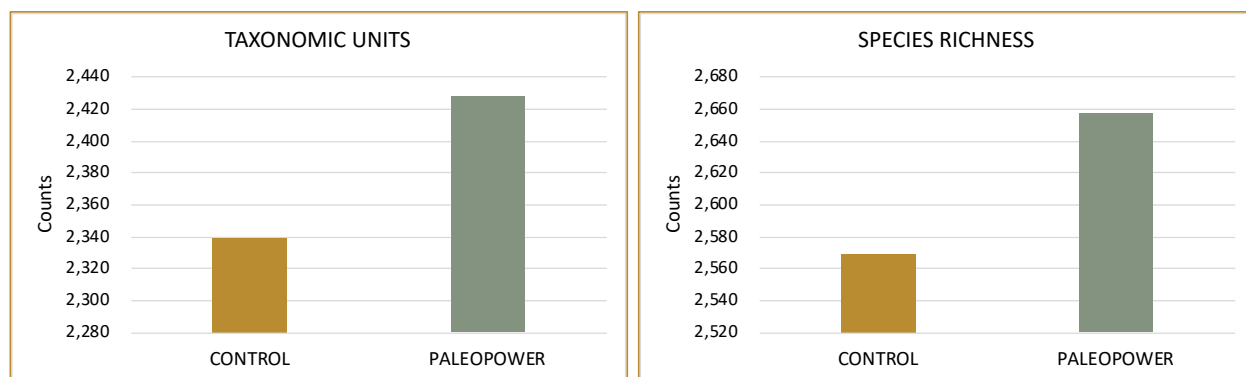
*Reduction of Glyphosate Levels in Vineyard Soils*



### **Soil Microbiome**

Vineyard soil samples were tested by EZBiome to assess the changes, if any, in the soil microbiome composition, before and after the application of PaleoPower. The metric used to assess soil health improvement was the alpha diversity of the soils in the March and October samplings. “Alpha diversity” refers to the variety of species within a particular community or ecosystem. It is a measure of how many different species are present and how abundant they are relative to each other. Key aspects of alpha diversity are the number of Taxonomic Units (microbial composition) and Species Richness. Taxonomic Units indicates the total number of organisms in the soil and Species Richness indicates the number of different species present in a community.

PaleoPower meaningfully improves the alpha diversity of the soil. See results below.



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The greater the alpha diversity of the microbial community, the greater the beneficial impact of the microbial community on soil health. This is due to several reasons:

- **Functional Redundancy:** More diverse communities have multiple species capable of performing similar functions like nutrient cycling, decomposition, and disease suppression. This redundancy ensures these vital functions are maintained even if one species declines.
- **Resilience:** Diverse communities are more resilient to disturbances like environmental changes, agricultural practices, or pathogen outbreaks.
- **Increased Nutrient Availability:** A variety of microbes with different metabolic capabilities can access and utilize a wider range of nutrients from organic matter and other sources, making them more available for plants.
- **Soil Structure and Stability:** A diverse community is likely to contain a greater number of beneficial microbes that produce glue-like substances that bind soil particles together, improving soil structure.

## Conclusions

In this controlled vineyard study, PaleoPower demonstrated the ability to:

- Improve soil health by (1). Significantly reducing glyphosate levels in soils, and (2) Increasing the alpha diversity of the soil microbiome, contributing to a more robust and resilient soil ecosystem.
- Reduce glyphosate levels in grapes as a result of reducing glyphosate levels in soil.

These findings suggest that PaleoPower could be a valuable tool for promoting sustainable agriculture and safeguarding human health by reducing glyphosate contamination in foods and beverages.

## References

1. Ashley-Martin, J., Huang, R., MacPherson, S., Brion, O., Owen, J., Gaudreau, E., Bienvenu, J.F., Fisher, M., Borghese, M.M., Bouchard, M.F. and Lanphear, B., 2023. Urinary concentrations and determinants of glyphosate and glufosinate in pregnant Canadian participants in the MIREC study. *Environmental Research*, 217, p.114842.
2. Rawat, D., Bains, A., Chawla, P., Kaushik, R., Yadav, R., Kumar, A., Sridhar, K. and Sharma, M., 2023. Hazardous impacts of glyphosate on human and environment health: Occurrence and detection in food. *Chemosphere*, p.138676.
3. Wang, X., Lu, Q., Guo, J., Ares, I., Martínez, M., Martínez-Larrañaga, M.R., Wang, X., Anadón, A. and Martínez, M.A., 2022. Oxidative stress and metabolism: a mechanistic insight for glyphosate toxicology. *Annual Review of Pharmacology and Toxicology*, 62, pp.617-639.



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