



Maryland Agriculture Commission: How we can help farmers be more profitable and Save the Bay

**Phospholutions Inc.
Est. 2016**



Our Purpose

RHIZOSORB®

Mission

Enhancing Global Phosphorus Use

Values

Mindful | Original | Bold

Belief

At Phospholutions, we believe sustainable and responsible production of phosphorus is fundamental for ...

- **Maximizing Grower Profitability**
- **Increasing the effectiveness of P_2O_5**
- **Meeting Global Food Demand**
- **Less Environmental Impact**
- **Cleaner Water & Air**
- **Lower Cost Phosphorus Production**



Global P Use is Inefficient & Unsustainable



Inefficient Use

As much as 90% of conventional P fertilizer is wasted, lowering profitability for growers and contributing to runoff



Global Impact

Inefficient use degrades our waterways and is a large contributor of GHG emissions at ~1.7MT CO₂ eq./ MT P₂O₅



Limited Resource

P rock is mined in only a few select regions globally, limiting availability and contributing to food insecurity

No revolutionary innovation in phosphorus fertilizer manufacturing in 60 years.

RHIZOSORB®

The Next Generation of Phosphorus Fertilizers

Benefiting Manufacturers, Growers, & Environment



Preserved Yields

Growers use 50% less phosphorus per acre cutting fertilizer costs with an ROI of up to \$20/A



Sustainable

Reduces GHG emissions for P fertilizer use by 45% per acre and reduces runoff potential by 78%



Higher Profitability

RhizoSorb® both lowers cost of production and increases sales premium per ton



Scalable & Easy to Use

Only patented fertilizer additive embedded directly into fertilizer granules during upstream production

RhizoSorb Development History



1991

Technology develop by
Penn State
Researchers



2016

Phospholutions
founded, IP licensed



2018

RhizoSorb® studied
in small plot trials



2021

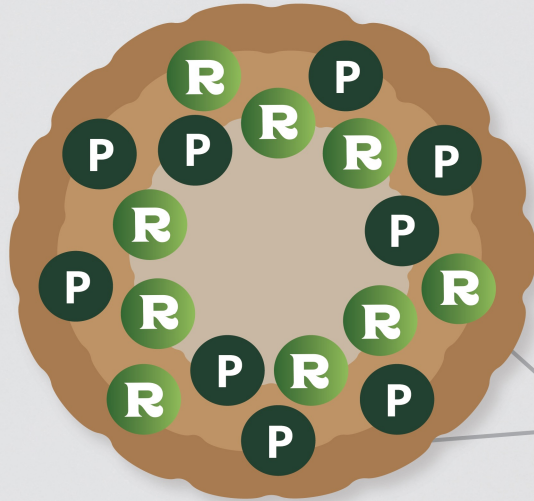
RhizoSorb® performance
+ on-farm trials
conducted across US



2023

Commercial launch
through Ag retail

Ensuring Fertilizer is Available When Needed



Plant-Based Release

RhizoSorb® releases P based on plant dependent factors rather than environmental conditions allowing the plant to utilize more applied nutrients during the growing season.

Soil Chemistry Approach

Majority of applied phosphates are quickly tied up in the soil making them unavailable for plant uptake. RhizoSorb® acts as a reversible reservoir avoiding tie up while decreasing nutrient leaching.



Anionic Exchange Capacity

RhizoSorb® is the first technology that increases Anionic Exchange Capacity to promote more efficient nutrient exchange around the root zone.

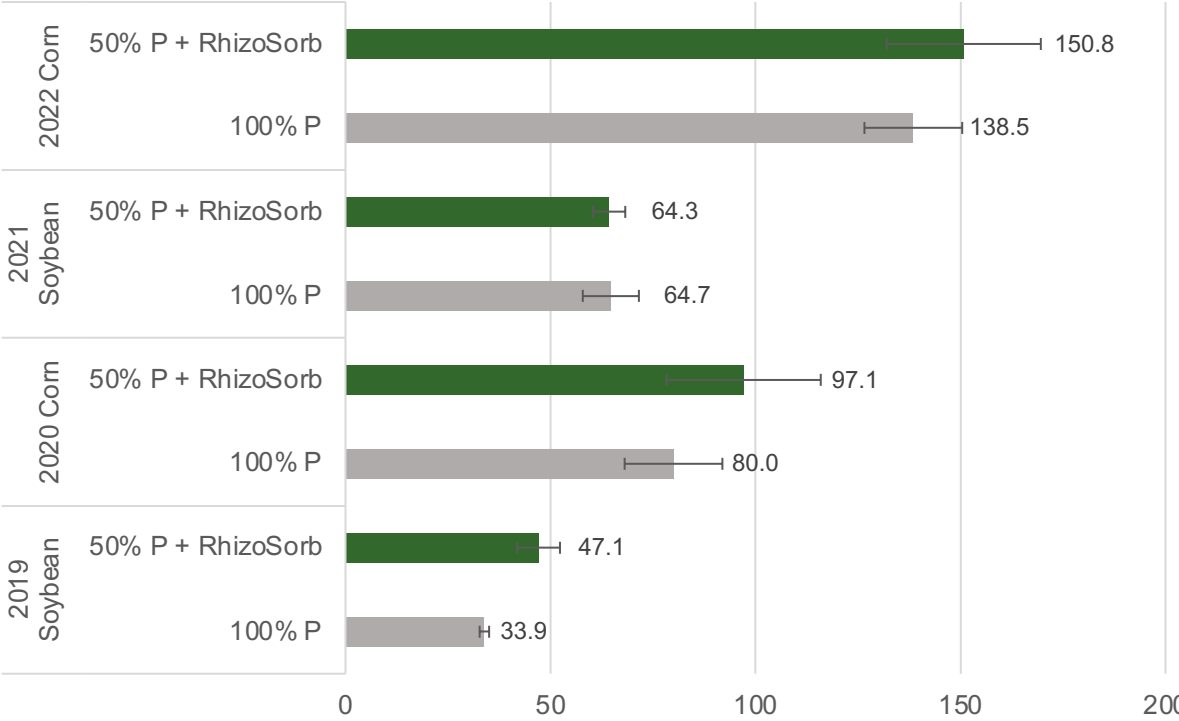
Commercialization Trial History

Scale	2019		2020		2021		2022		2023	
	Crop	Trial count	Crop	Trial count	Crop	Trial count	Crop	Trial count	Crop	Trial Count
Lab Assays	RhizoSorb®	2	RhizoSorb®	4	+ Alternative Materials	9	+Alternative Materials	120+	+Alternative Materials	95+
Grow room			Rye grass	3	Rye grass	11	Rye grass	16	Rye grass	5
Green house	Turfgrass	2	Corn	1	Corn	2	Corn	3	N/A	0
Small-plot replicated	Soybean	1	Corn & soy	9	Corn, soy, other	46	Corn & soy	49	Corn, soy & potato	28
Large-acre trials					Corn, soy, canola	21	Corn, soy, canola	75	Corn, soy canola	57
	Total	5	Total	17	Total	89	Total	263+	Total	185+

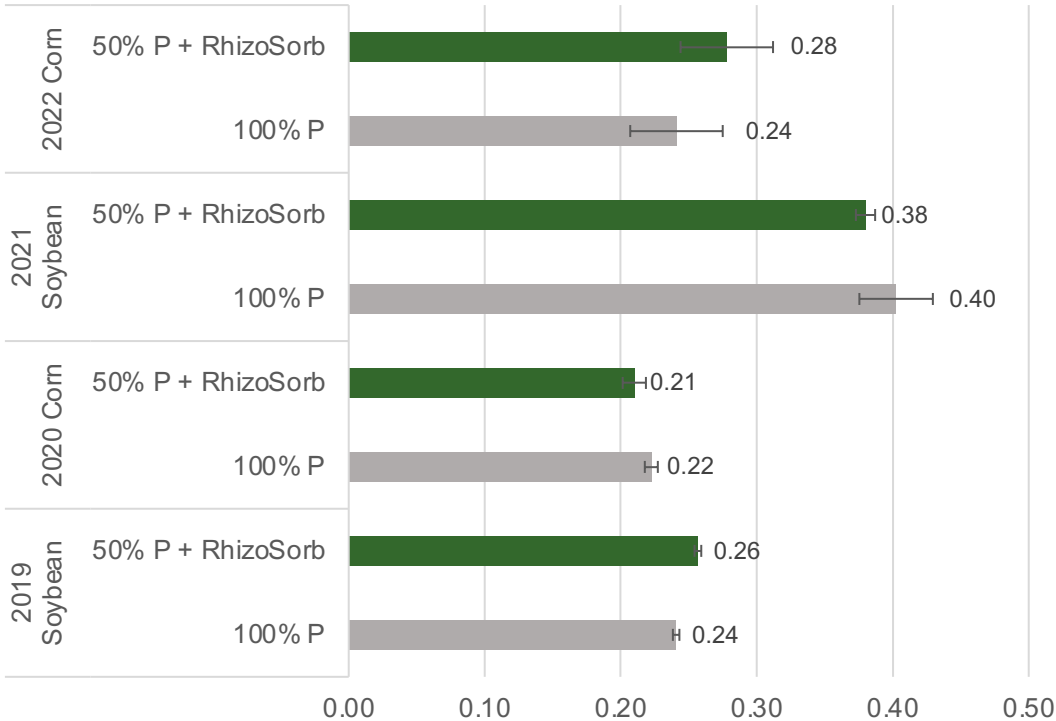
RhizoSorb® has been rigorously tested in more than 500 trials

Multi-Year Phosphate Study 2019-2022

Crop yields (bu/A)



R2 leaf tissue P (%)



Research contracted trials conducted at The Pennsylvania State University

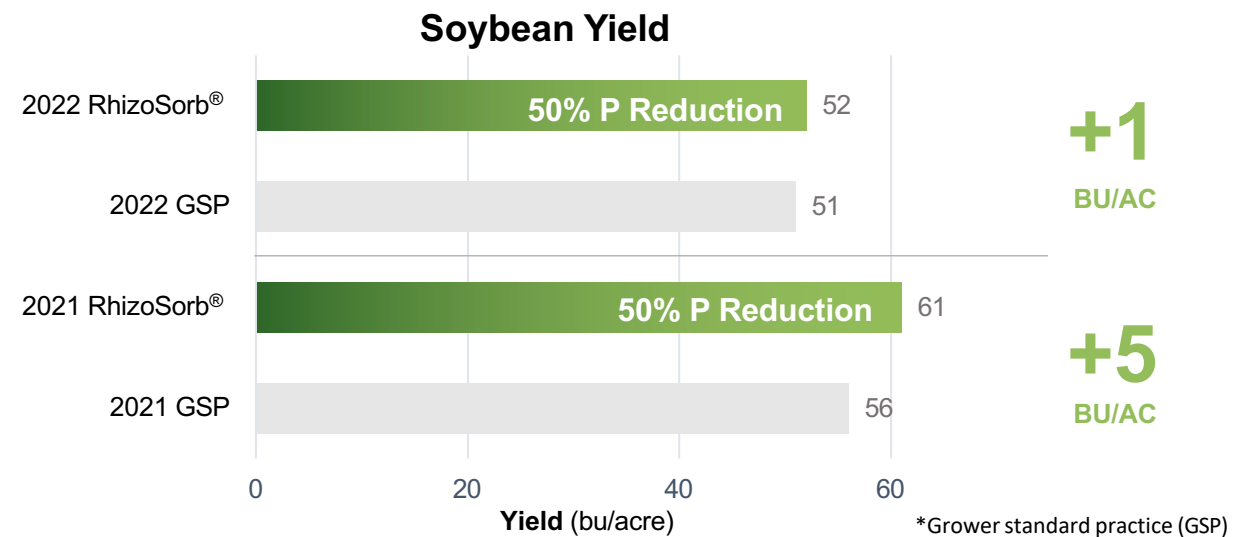
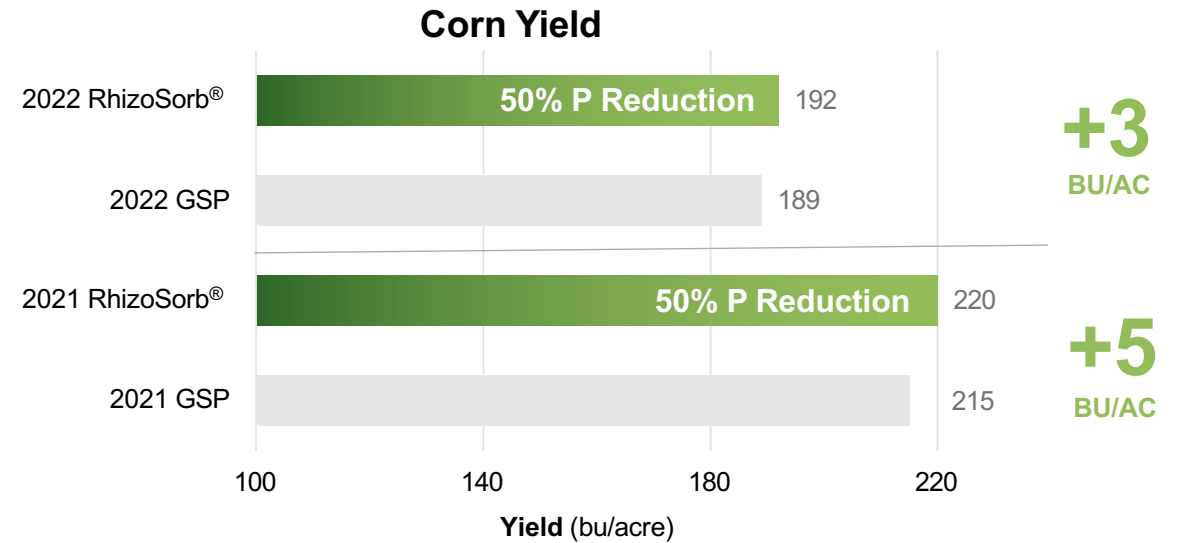
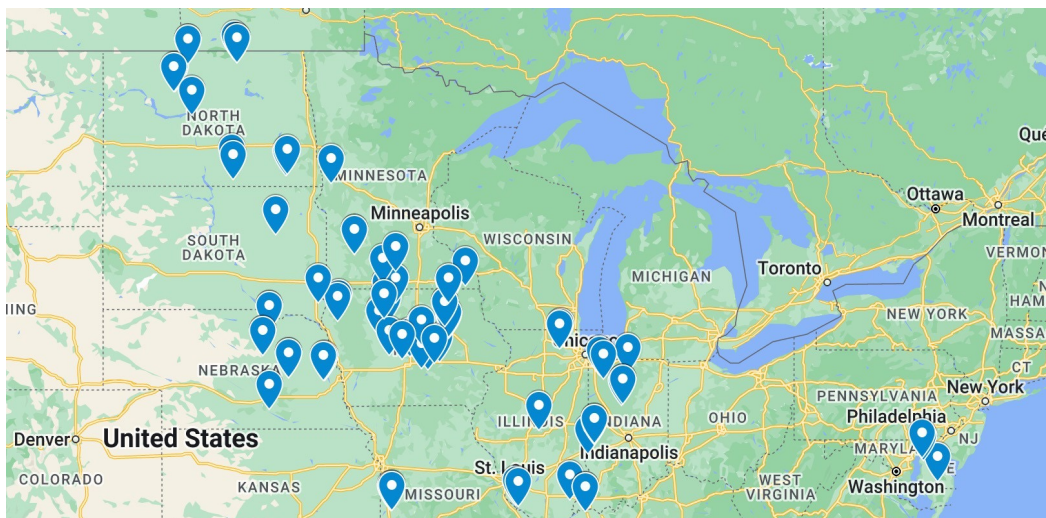


Proven to Increase Yield Using 50% Less Phosphorus Fertilizer

RhizoSorb® has been tested across 500+ trial locations across 14 states demonstrating increased yields using 50% less phosphorus per acre.

Iowa Spotlight
 RhizoSorb® had a 92% success rate across 31 sites in 2022 using 50% less P.

+3.6 BU/AC





Sustainability Impact

- Reduce runoff potential by 78% and leaching by 84%¹
- Decrease Eutrophication by 40.5%
- Decrease CO₂e emissions by 45.2%
- Decrease Fresh Water Aquatic Ecotoxicity by 46.3%²
- Decrease Marine Aquatic Ecotoxicity by 44.8%²

1. Study conducted by New Zealand Plant and Food Research Institute

2. LCA based on corn application in comparison to MAP.
Global warming excludes additional reductions from reducing eutrophication.

Reducing Phosphorus Loss with RhizoSorb®

2022 Simulated Annual Phosphorus Loss - Chemical Fertilizer

- 2.825 million lbs.

2022 Simulated Annual Phosphorus Loss - 100% RhizoSorb® Replacement

- 621,500 lbs.

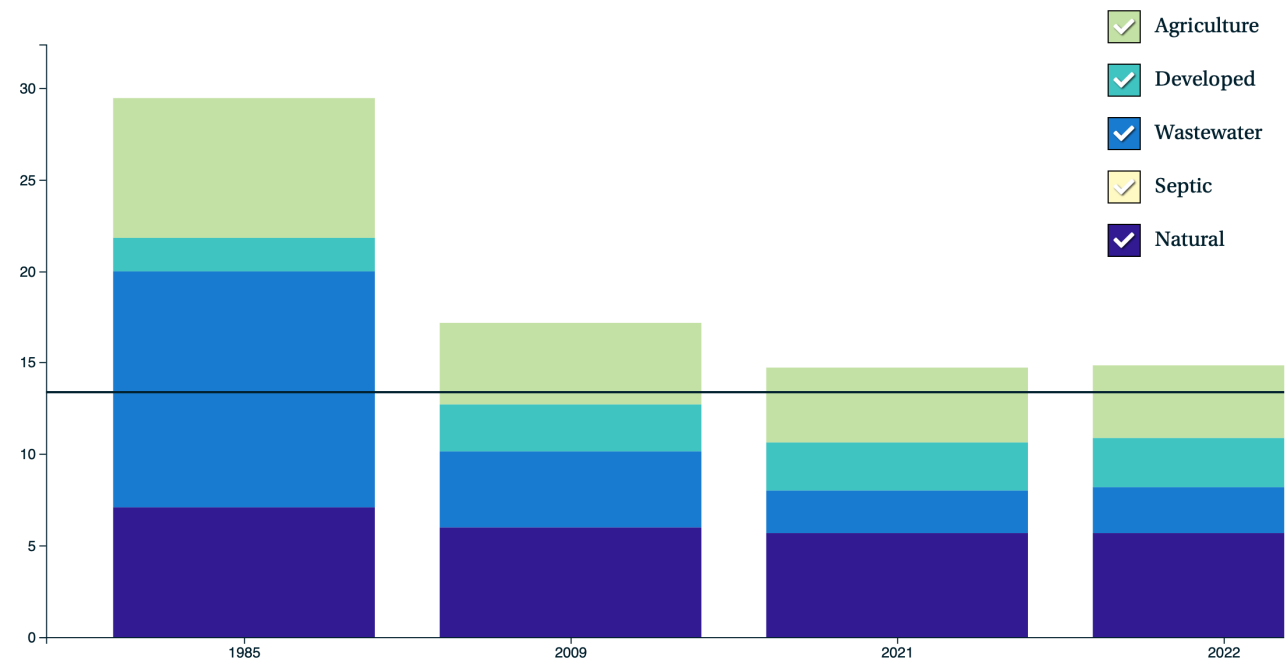
2025 Phosphorus Loss Goal

- 13.31 million lbs.

2025 Simulated Phosphorus Loss with 100% RhizoSorb® Replacement

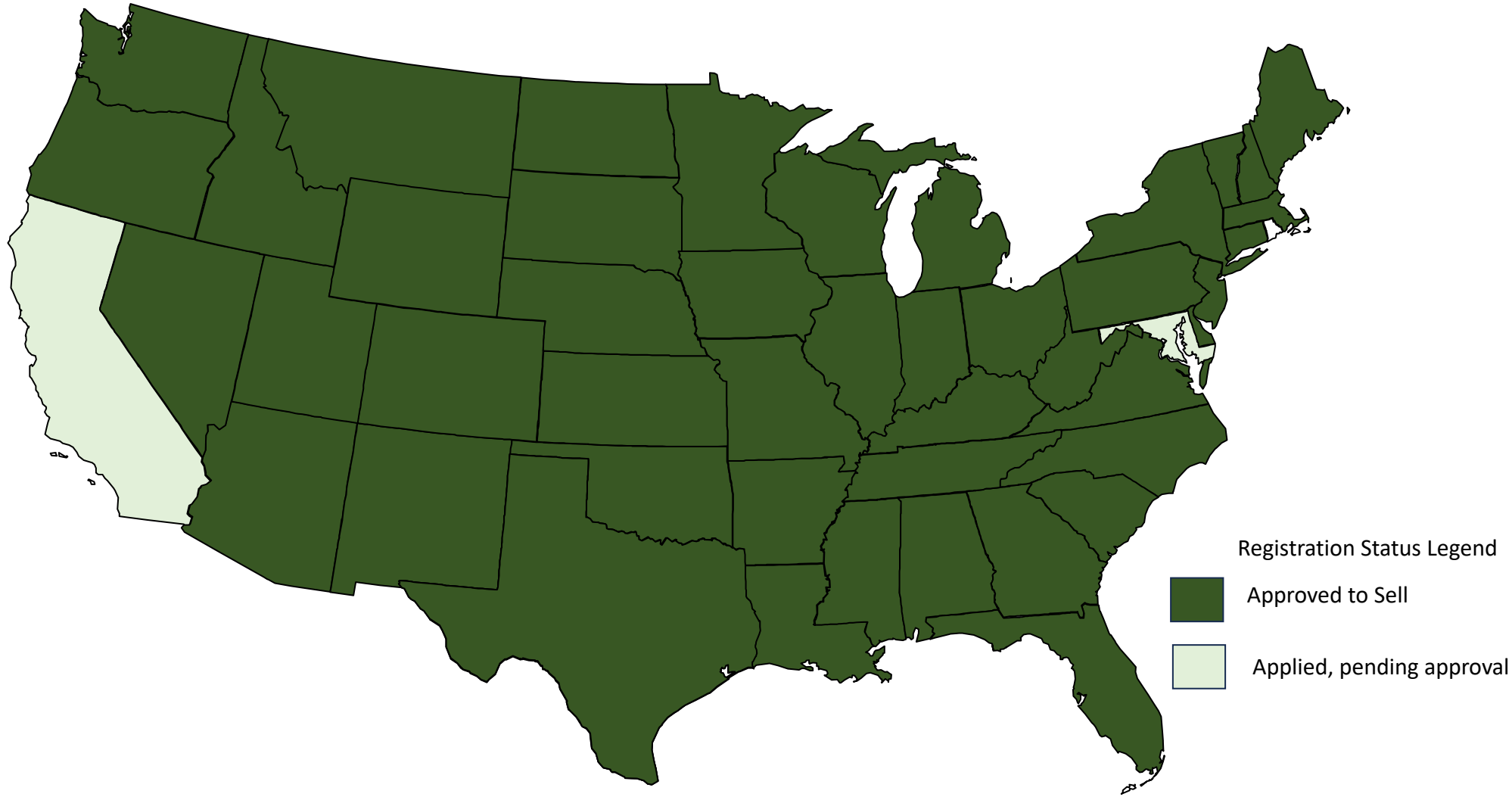
- 11.34 million lbs.

Modeled Phosphorus Loads to the Chesapeake Bay (1985-2022)



Source:
<https://www.chesapeakeprogress.com/charts/modeled-phosphorus-loads-to-the-chesapeake-bay-1985-2022>

RhizoSorb® 8-39-0 Commercial Sales Registration Status





Let's Make Global Phosphorus Use More Sustainable

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