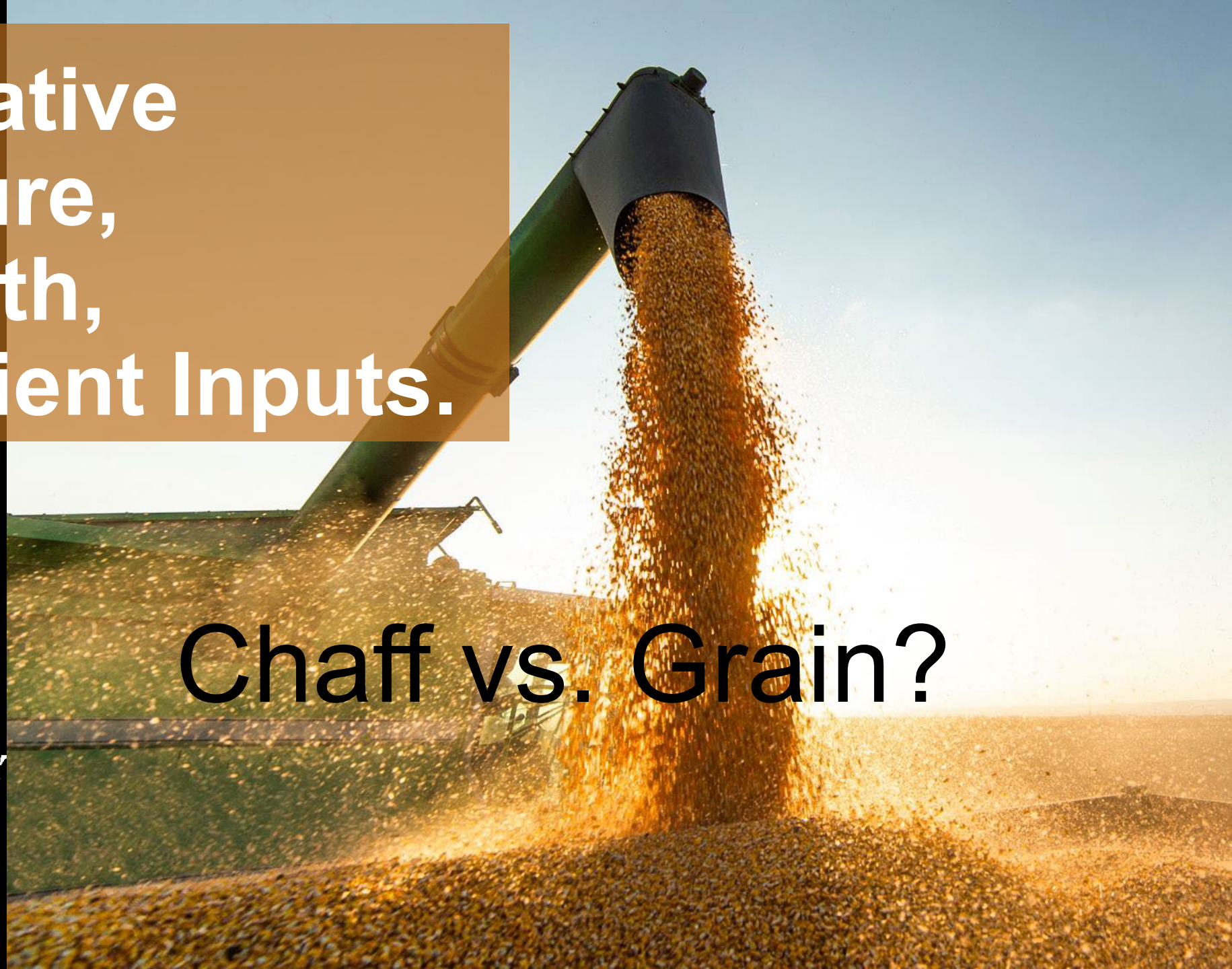
Regenerative Agriculture, Soil Health, and Nutrient Inputs.

Andrew McGuire



Chaff vs. Grain?

WASHINGTON STATE UNIVERSITY
EXTENSION

CSANR

Center for Sustaining Agriculture and Natural Resources

Regenerative Agriculture: Solid Principles, Extraordinary Claims

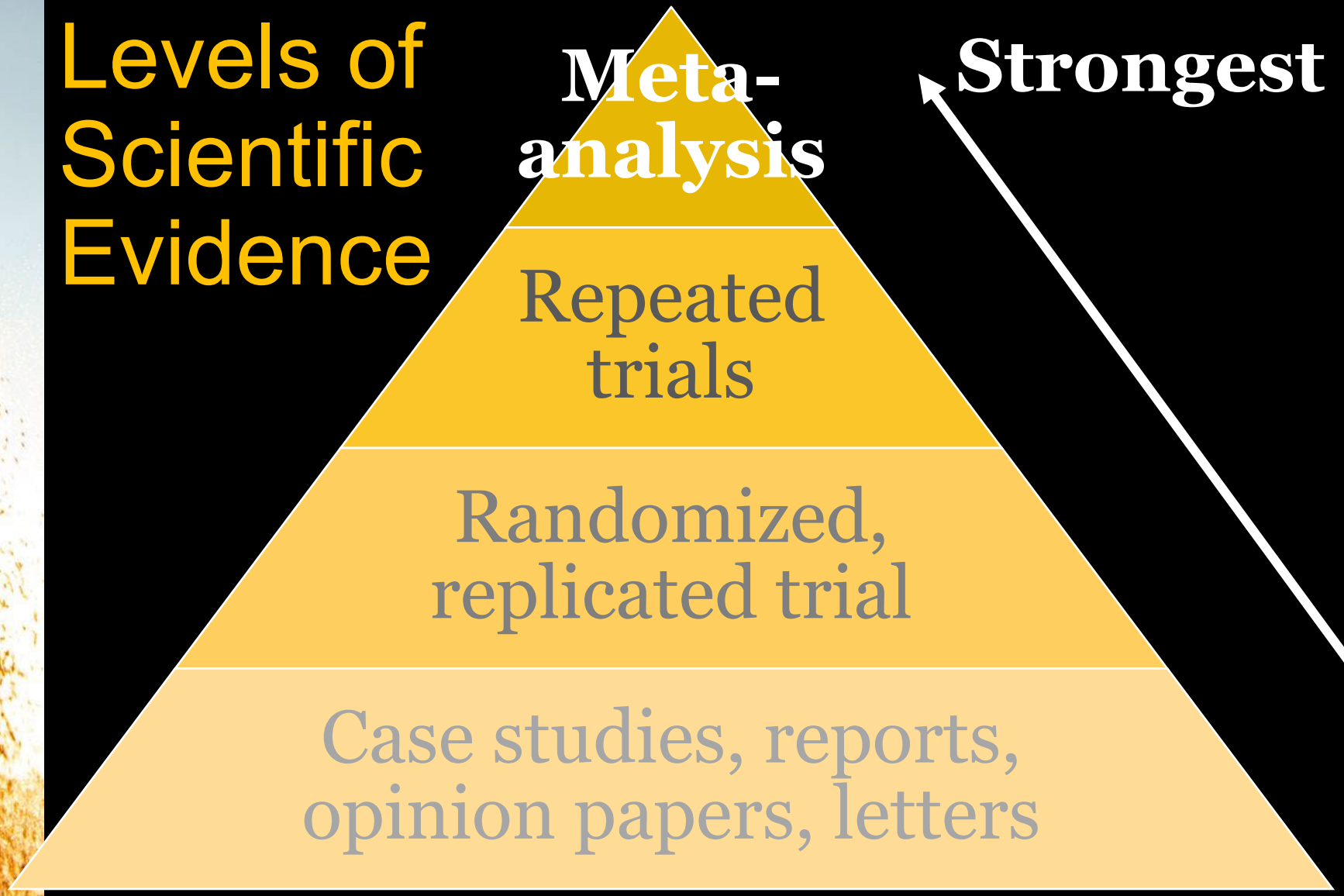
Posted by Andrew McGuire | April 4, 2018

CLAIM

What do research results suggest?

Very Unlikely	Unlikely	Possible	Likely	Very Likely

Levels of Scientific Evidence



Strongest

Weakest

Not Scientific Evidence:

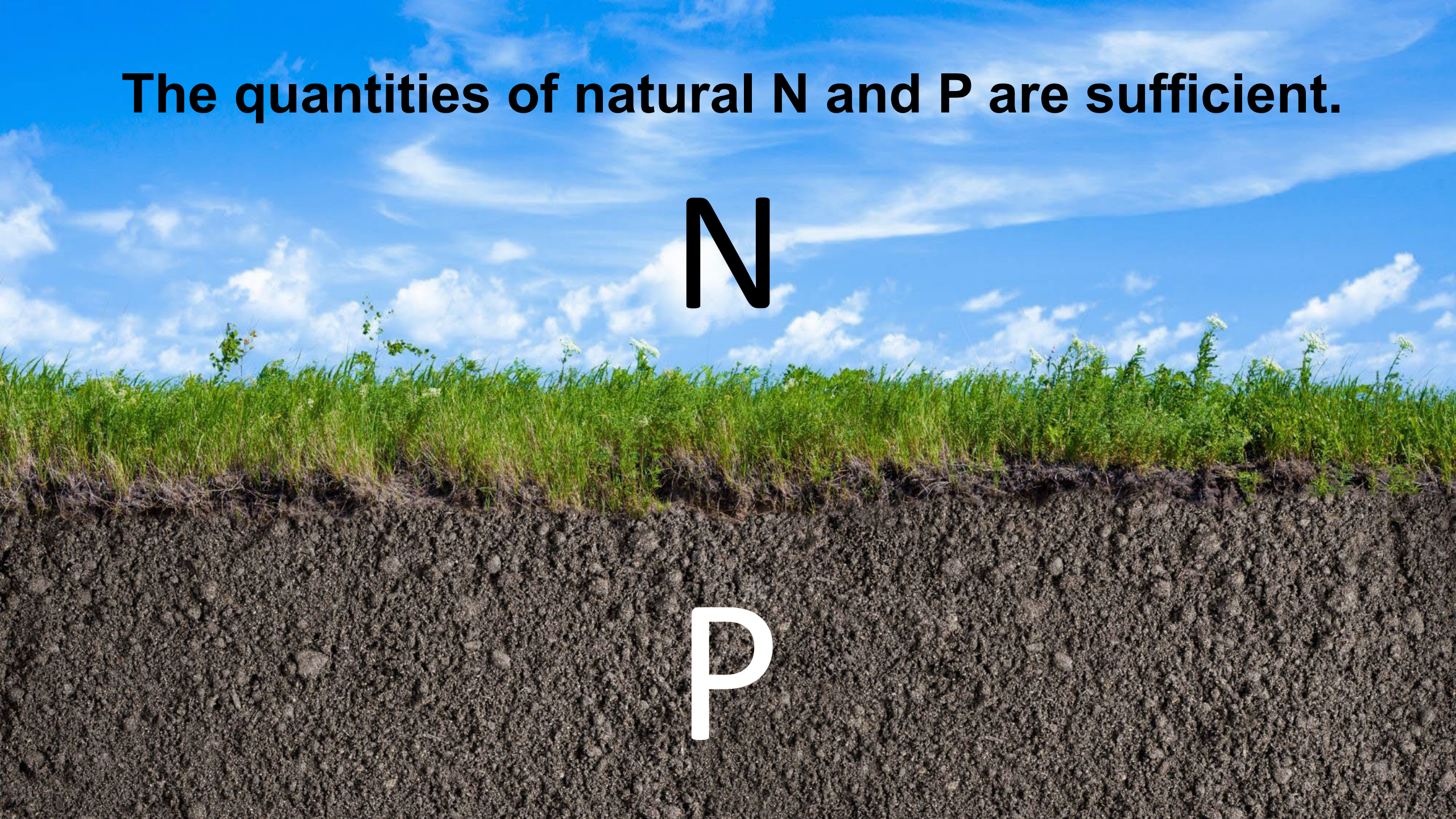
- YouTube videos
- Personal stories
- Comparing photos
- Gut feelings
- Websites
- Marketing


“Nobody fertilizes the rainforest”

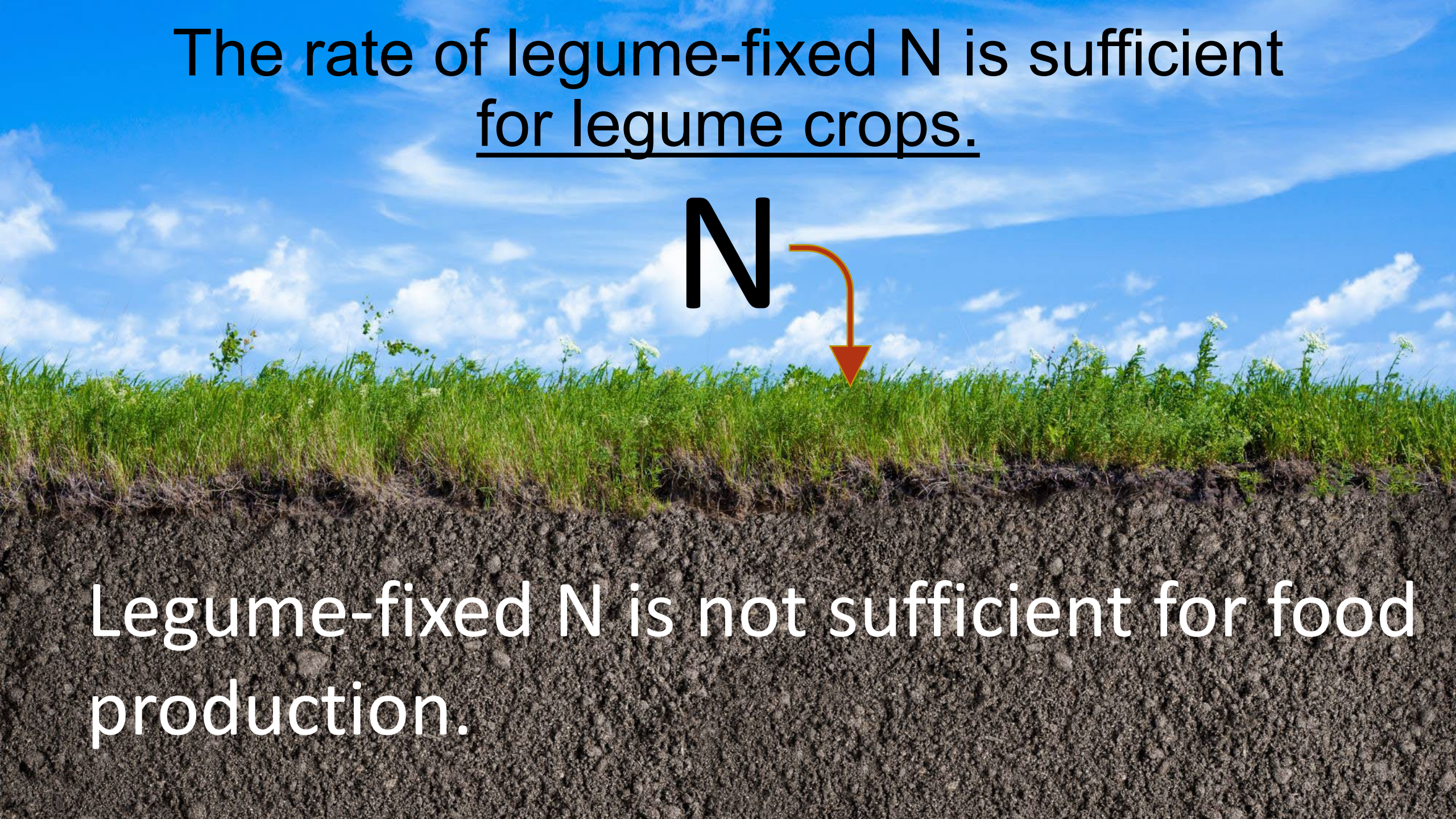
“The collective simplification of agroecosystems has led to a loss of biodiversity and to reductions in the supply of key ecosystem services to and from agriculture. Without these ecosystem services, monocultures become dependent on off-farm inputs.”

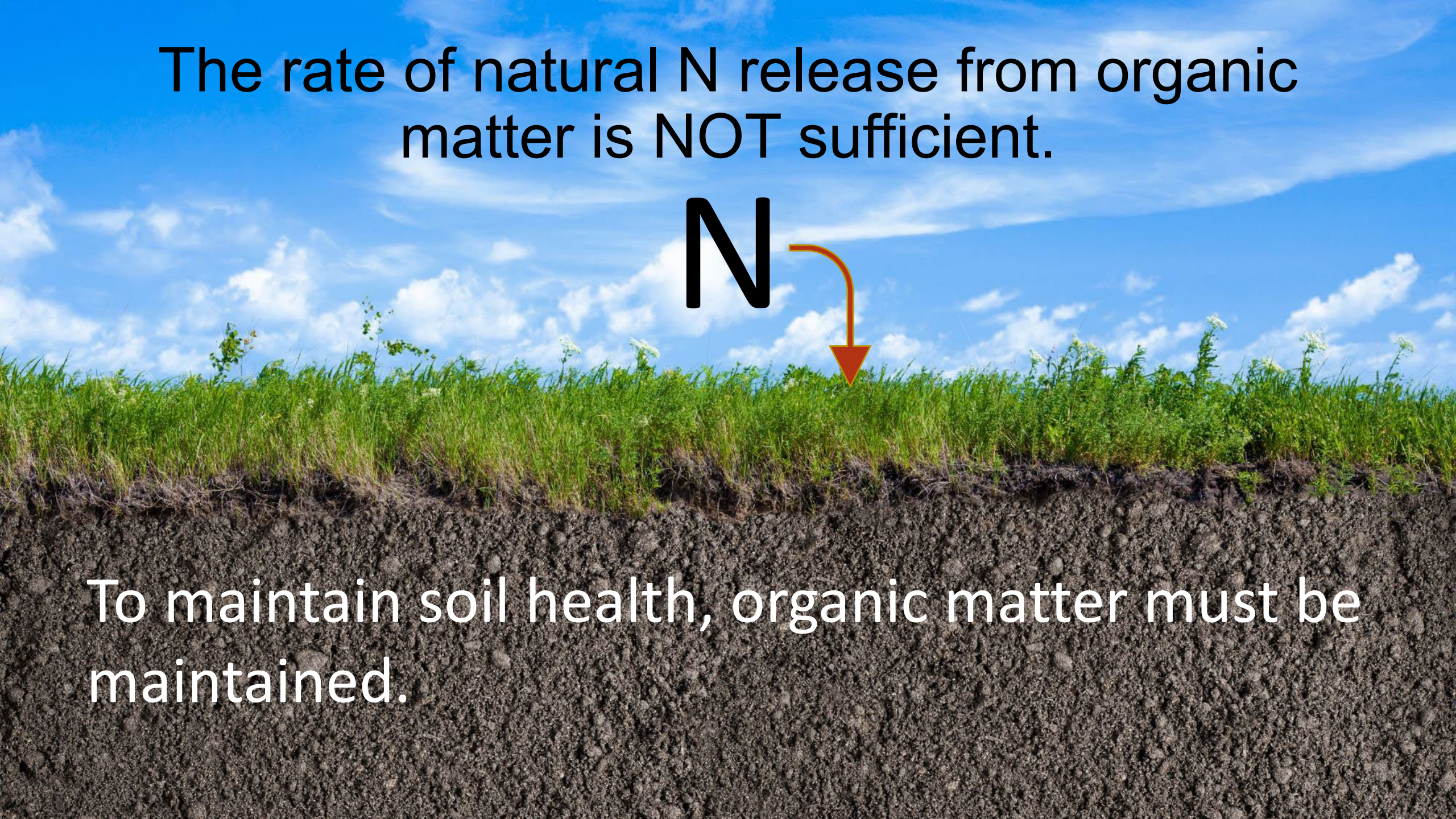
Claim: Healthy soils provide sufficient natural nutrients.

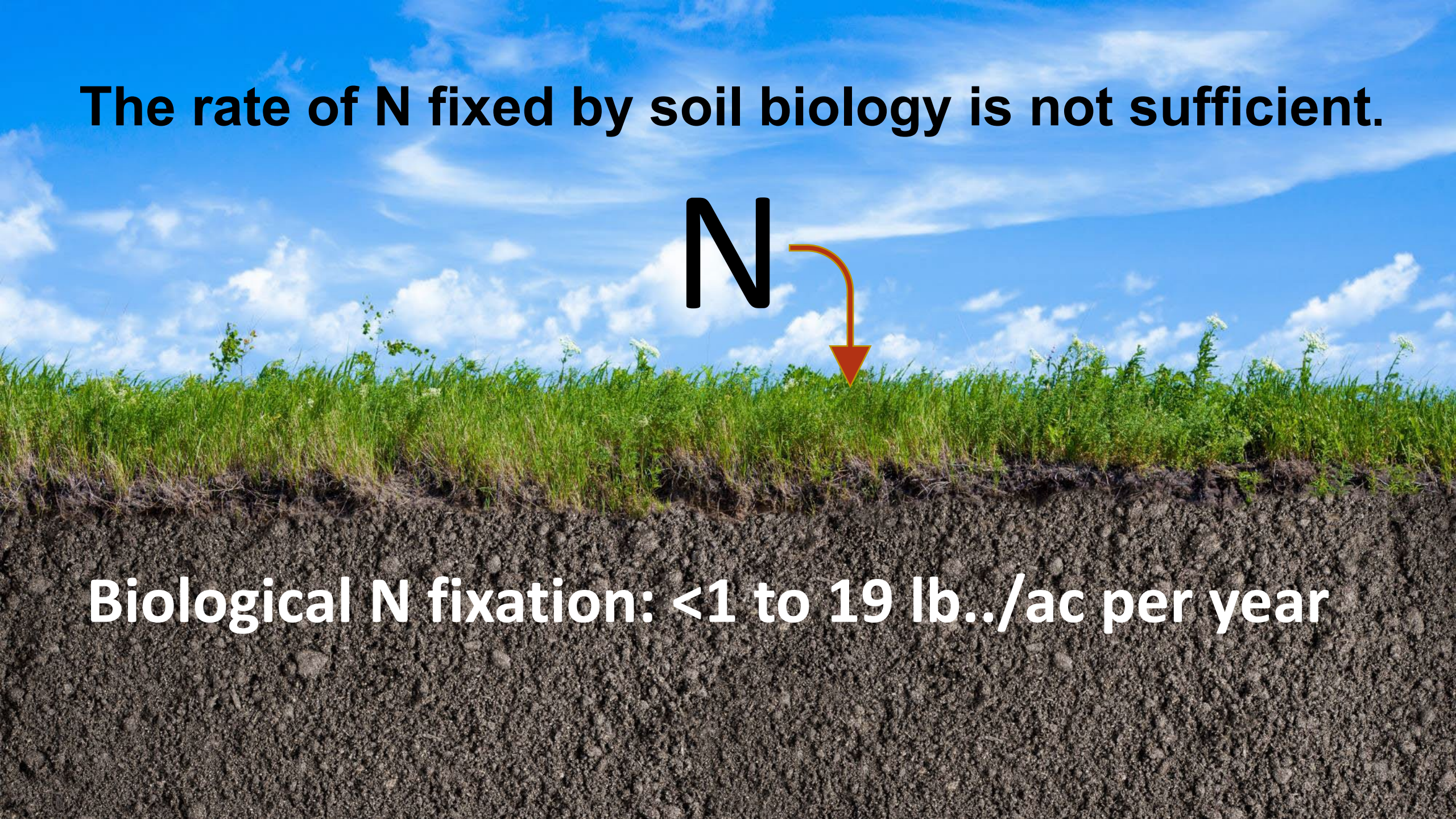
- *soil biology*
- *soil biodiversity*
- *soil health.*


The quantities of natural N and P are sufficient.
N
P

Slash and Burn agriculture works… given enough time


The rate of legume-fixed N is sufficient
for legume crops.
N
Legume-fixed N is not sufficient for food production.


The rate of natural N release from organic matter is NOT sufficient.
N
To maintain soil health, organic matter must be maintained.

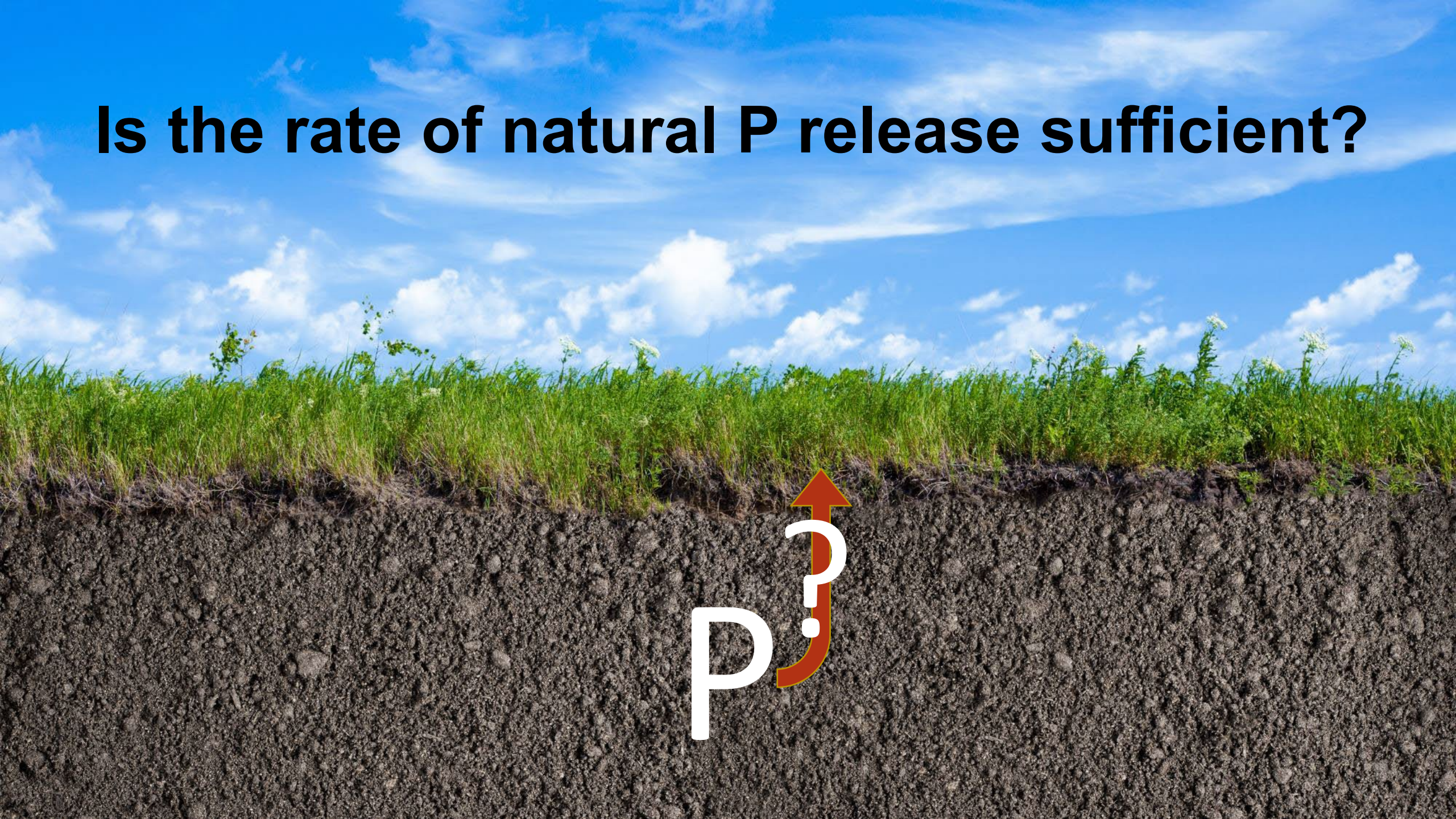

The rate of N fixed by soil biology is not sufficient.
N
Biological N fixation: <1 to 19 lb../ac per year

Claim: Regenerative ag & Soil health can replace N fertilizer inputs.

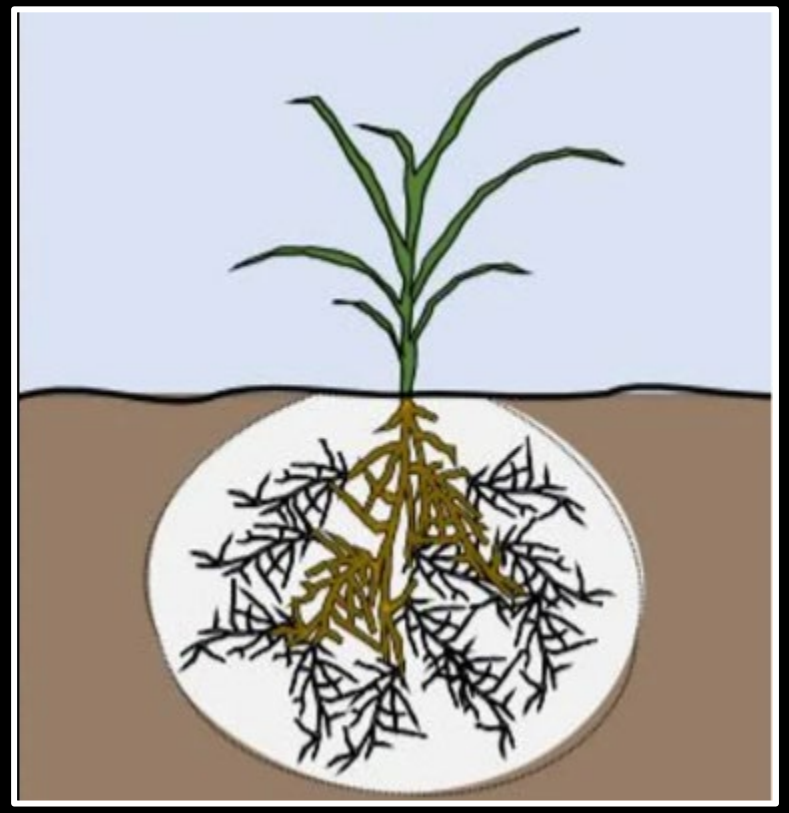
Annual and non-legume forage crops

Very Unlikely	Unlikely	Possible	Likely	Very Likely

Is the rate of natural P release sufficient?



Fungal networks help plants extend their range and EXTRACT more P.



Mycorrhiza

The rate of natural P is not sufficient.

Biological + weathering
= ~5 lb. P/ac per year

P

Claim: Regenerative ag & Soil health can replace P fertilizer inputs.

Research Says

Very Unlikely	Unlikely	Possible	Likely	Very Likely

Long-term experiments show long-term unfertilized yields are low.

Hay: 1.2 tons per acre

Corn: 36 bu. per acre

scientific reports

Article | Open Access | Published: 03 March 2020

Improved soil biological health increases corn grain yield in N fertilized systems across the Corn Belt

Jordon Wade, Steve W. Culman, Jessica A. R. Logan, Hanna Poffenbarger, M. Scott Demyan, John H.

- Soil health had NO EFFECT on yields from unfertilized plots.
- Climate (temperature and water) =largest factor affecting yield.
- Effect of soil health on corn yield was about 1/5th of that from N fertilizer.

Nutrient Management

Soil Health

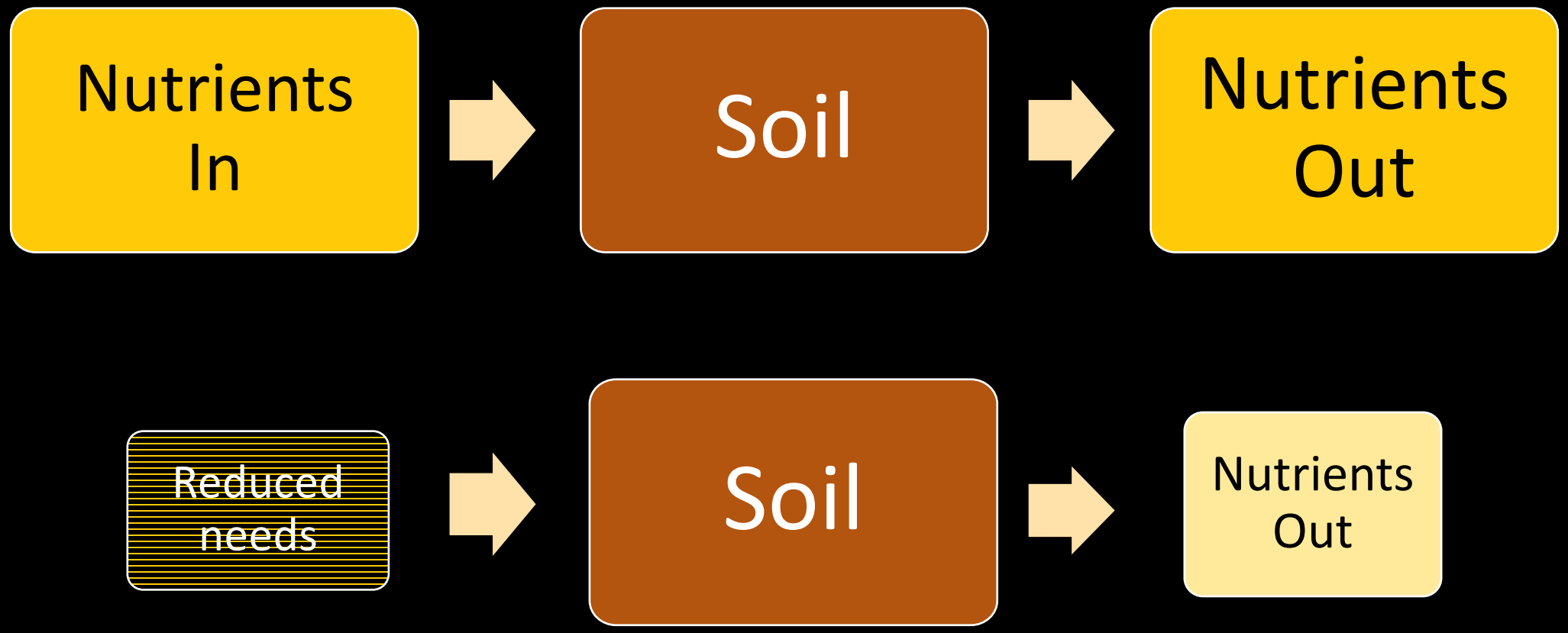
Claim: Healthy soils don’t need fertilizer.

Research Says

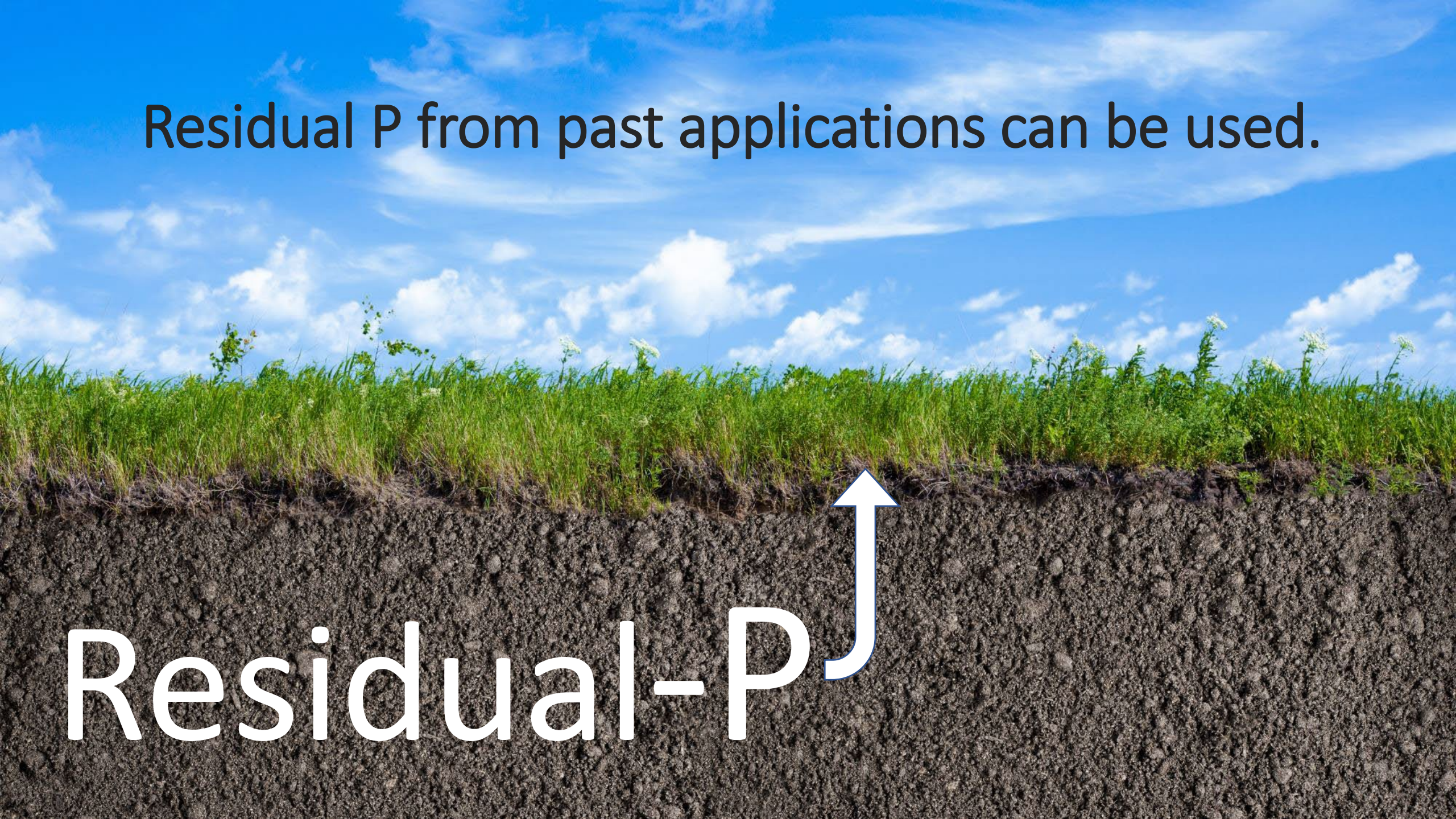
Very Unlikely	Unlikely	Possible	Likely	Very Likely

Agriculture exports at least 5x more nutrients than nature does.

“Reduce your exports to reduce your inputs”



Residual P from past applications can be used.



Agriculture is not Nature

- Inputs
- Outputs
- Output quality
- Types of plants
- etc.

Other “Unlikely” practices/claims from regenerative agriculture and soil health

- Cover crop mixtures
- Soil biodiversity
- Need to add soil microbe species
- Fungal:Bacterial ratios
- A healthy soil produces healthy crops

Very Unlikely	Unlikely	Possible	Likely	Very Likely

Link to all blog posts with all references:

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