Effects of Alfalfa on Soil Health : Meta-analysis and Practical Research

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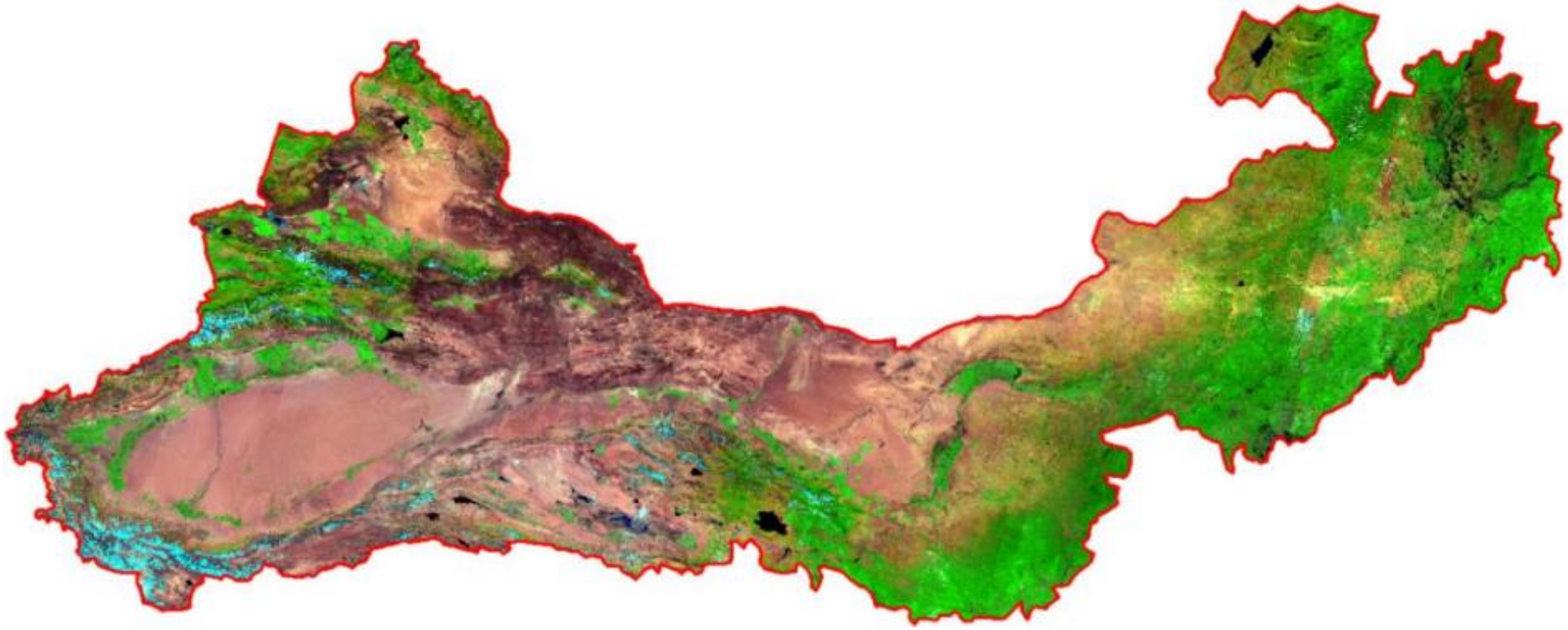
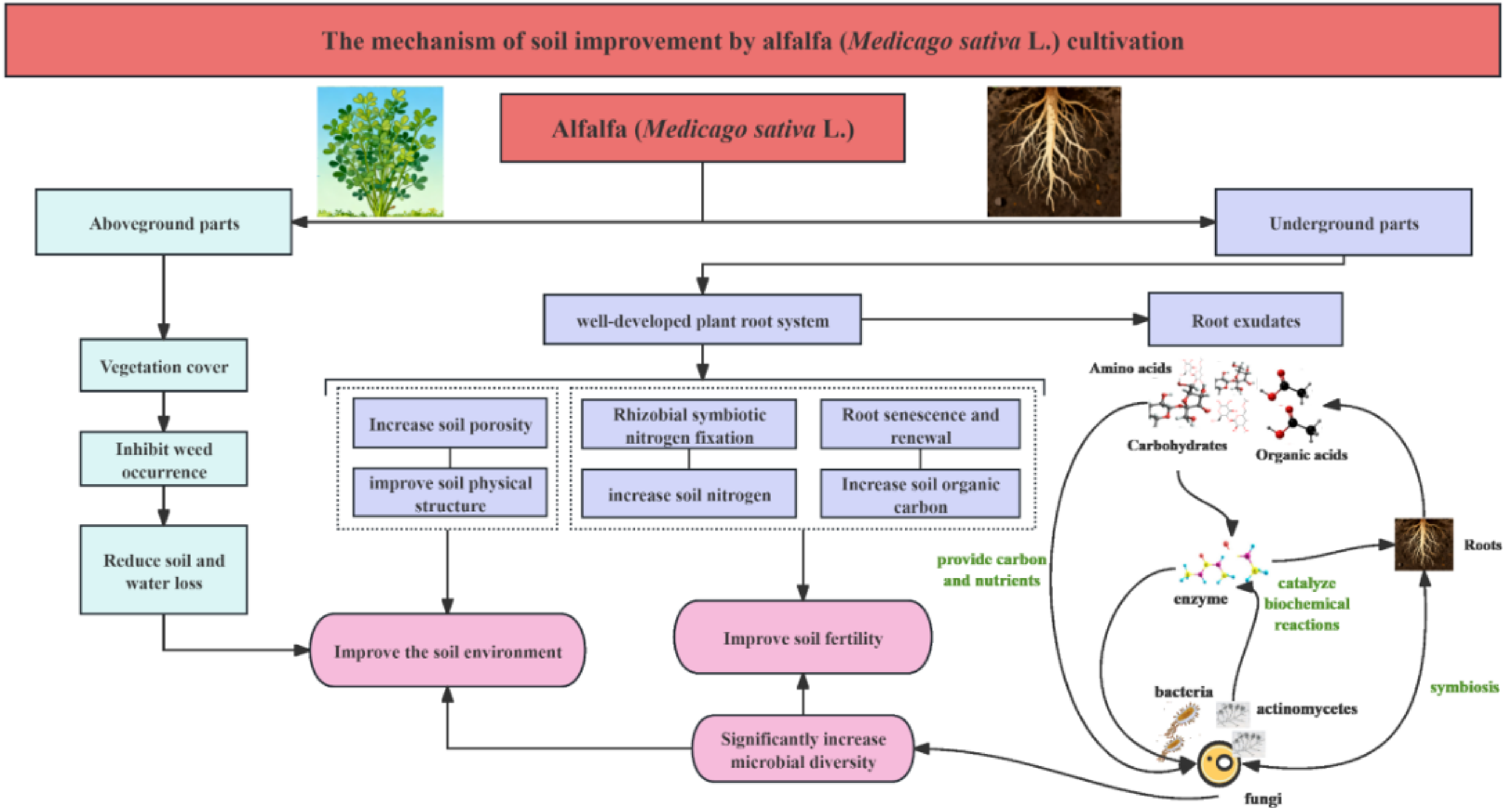
Background



Three-North Shelterbelt Project Area Remote Sensing Image

(Data source: Landsat, Imaging time: 2021)

Background



The well-developed root system of alfalfa, along with the harmonious symbiosis between its root exudates and soil microorganisms, plays a vital role in soil improvement.

Meta-analysis of the effects of alfalfa on soil health

Meta-analysis | Alfalfa & Soil Health | 2015-2024

2015

Literature Pool

Initial search returned 4,238 articles.

Data Extraction

Focus on 20 key soil health parameters.

Screening Criteria

Predefined Soil Indicators.

Replication & Variance Data.

Removal of Duplicate Datasets.

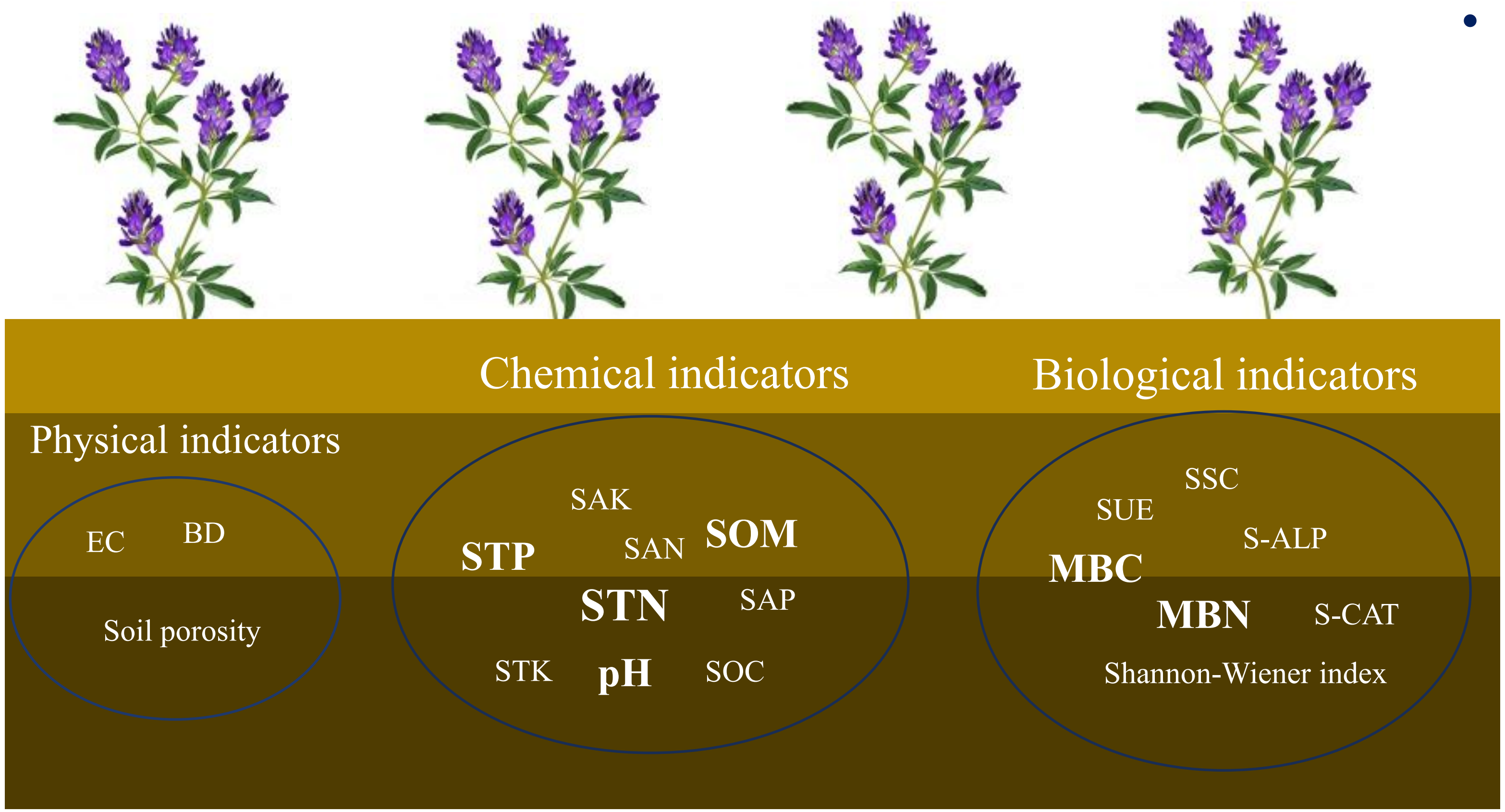
Analysis Goal

Quantify the effect of alfalfa on soil properties.

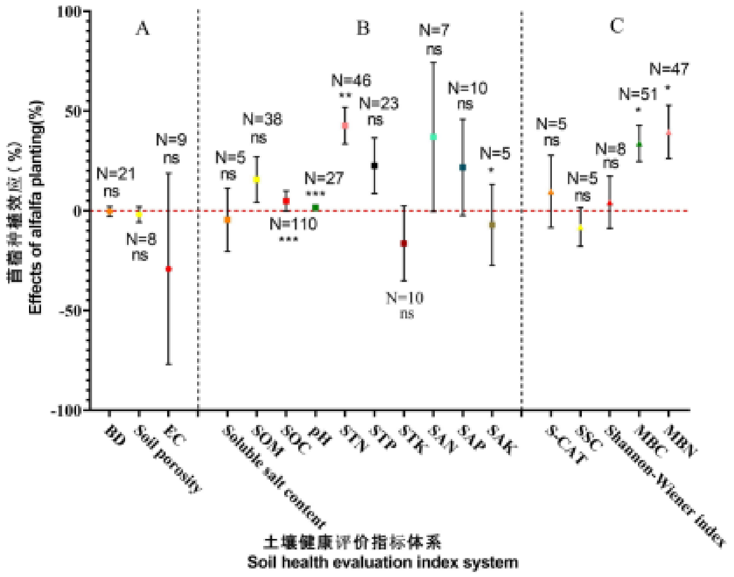
2024

Meta-analysis of the effects of alfalfa on soil health

Effects of alfalfa on soil health



- **Significantly promoted：SOM, pH, STN, STP, MBC, MBN**
- **Alfalfa planting had the most significant effect on the promotion of STN.**

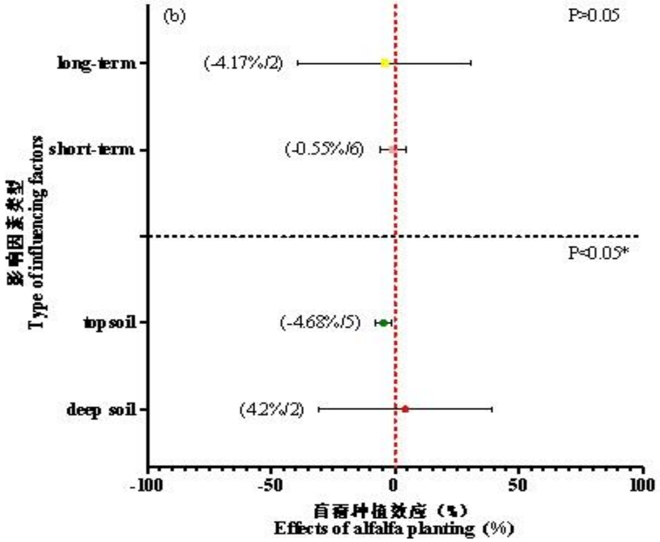


Meta-analysis of the effects of alfalfa on soil health

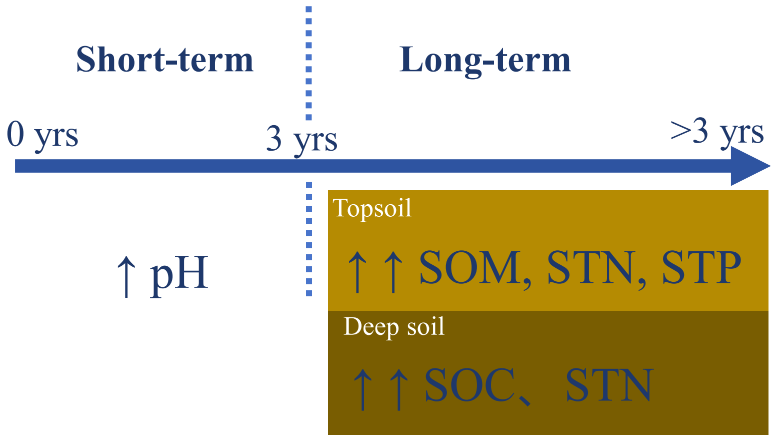
Physical Properties

•Significantly decreased **porosity** of the **topsoil**

•**Potential Cause:** Root Compaction & Organic accumulation



Chemical Properties



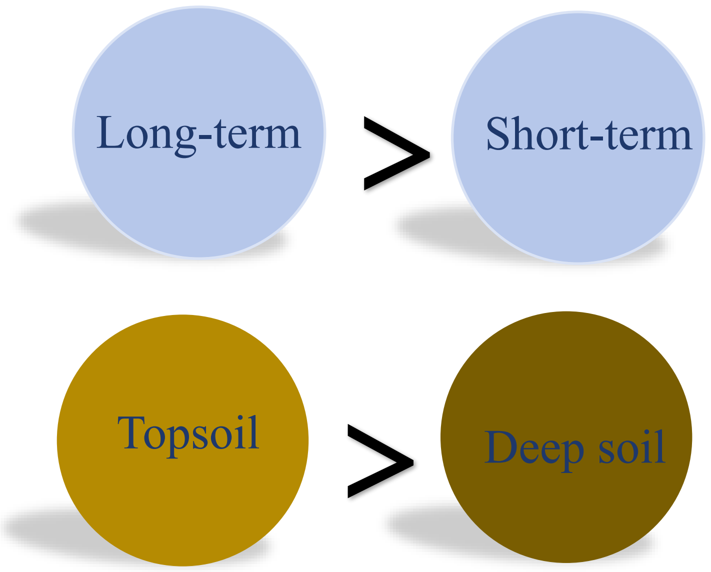
•Long-term planting significantly increases **SOM, STN, STP**. Short-term planting primarily increases soil **pH**.

•Alfalfa planting increased **SOM, STN, and STP** in the topsoil, and **SOC and STN** in the deep soil.

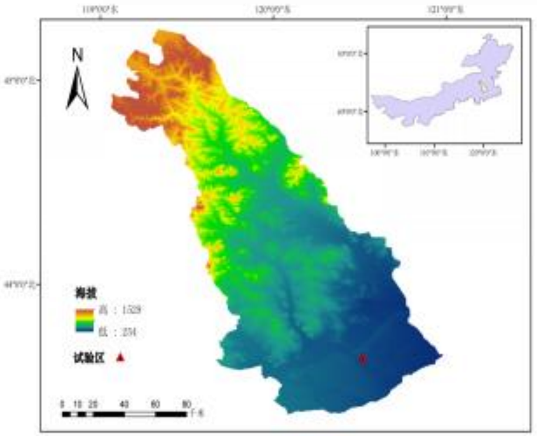
Biological Properties

•Alfalfa planting increased **MBC and MBN.**

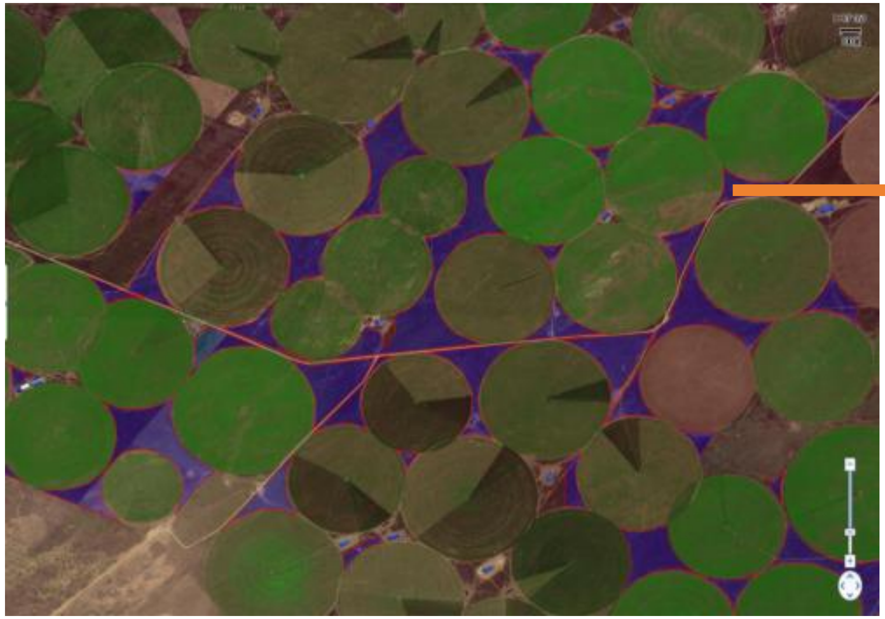
• Effect Intensity:



Practical research： alfalfa-grass mixed planting

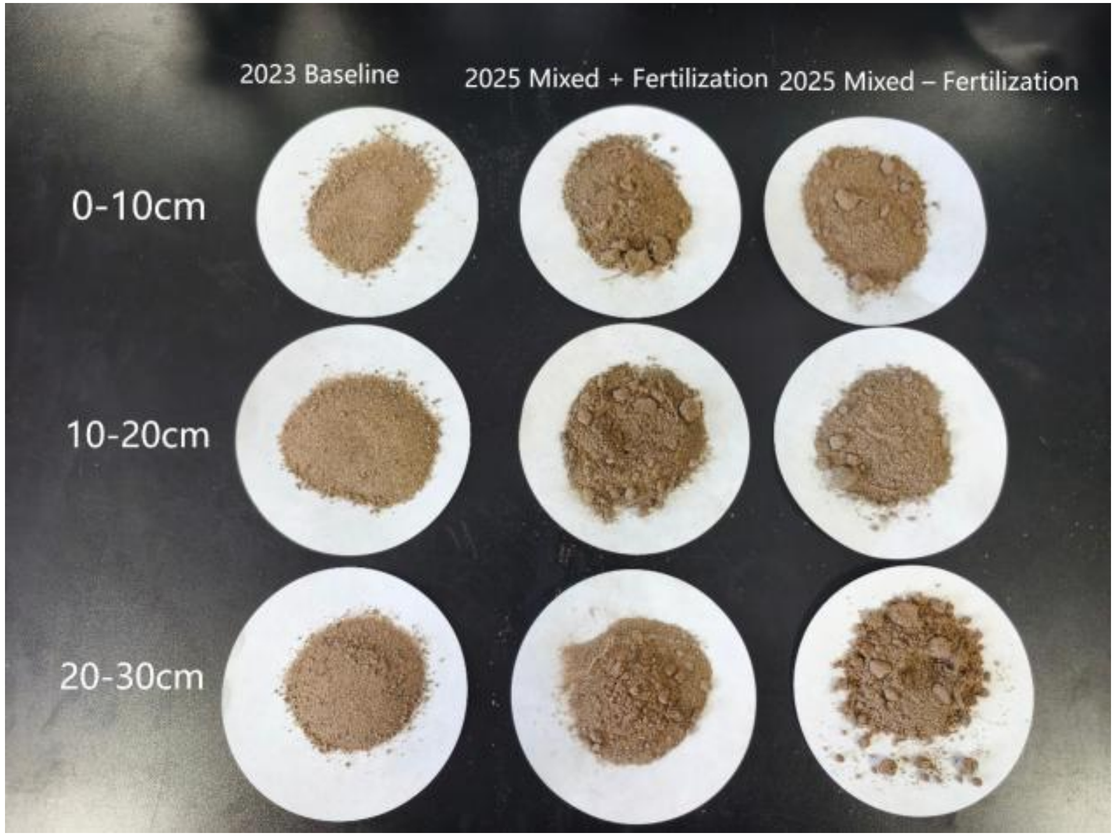


Research Location



The implementation site is located in a desertified grassland area with a soil organic matter content of 0.6%–0.7% Alfalfa and oat grassland were approximately 40,000 hectares. However, the continuous requires high irrigation water input posing challenges to sustainable production and utilization.

Practical research： alfalfa-grass mixed planting



Soil comparison map of mixed grassland before and after planting

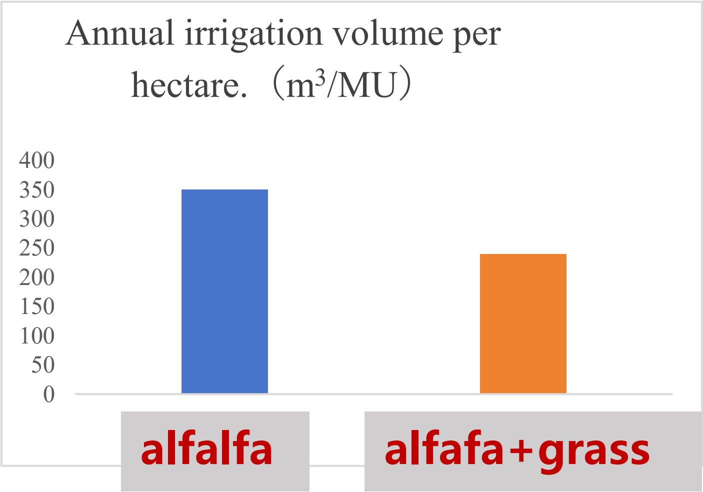
Natural grassland soil planing

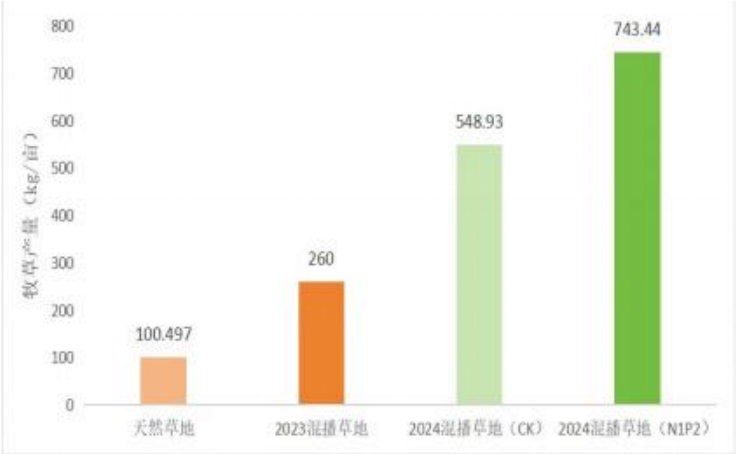
Soil surface of legume-grass mixed grassland

Practical research： alfalfa-grass mixed planting

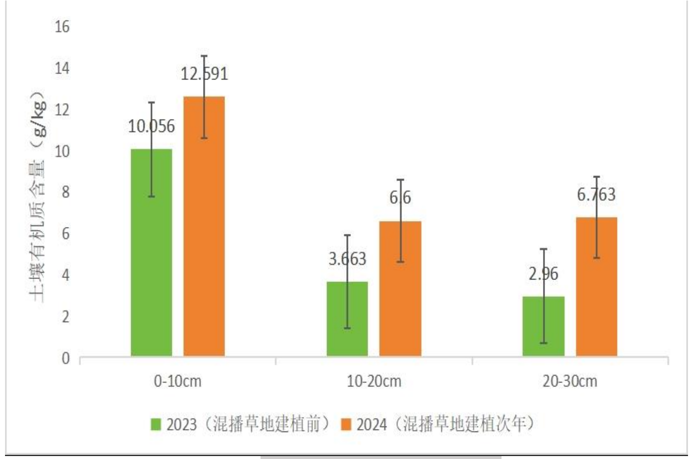
Before

After





Yield



SOM

CK

alfalfa+grass

Practical research： alfalfa-grass mixed planting

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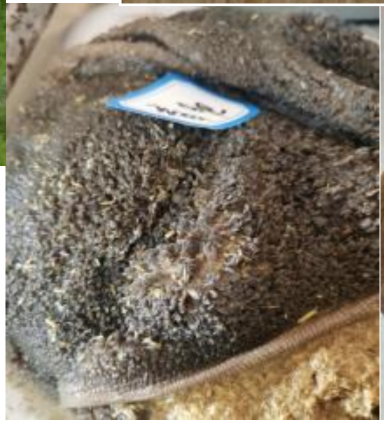

THANK YOU