AMERICAN CIDER ASSOCIATION

Farming Practices for Optimizing Orchard Soil Health

PRESENTED BY:

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AGENDA

1. Introduction
2. Soil Health 101
3. Orchard Cover Crops
4. 10 Year Study Results
5. Q & A

Soil Health 101 - Essential Nutrients

Macronutrients: N, P, K, Ca, Mg, S

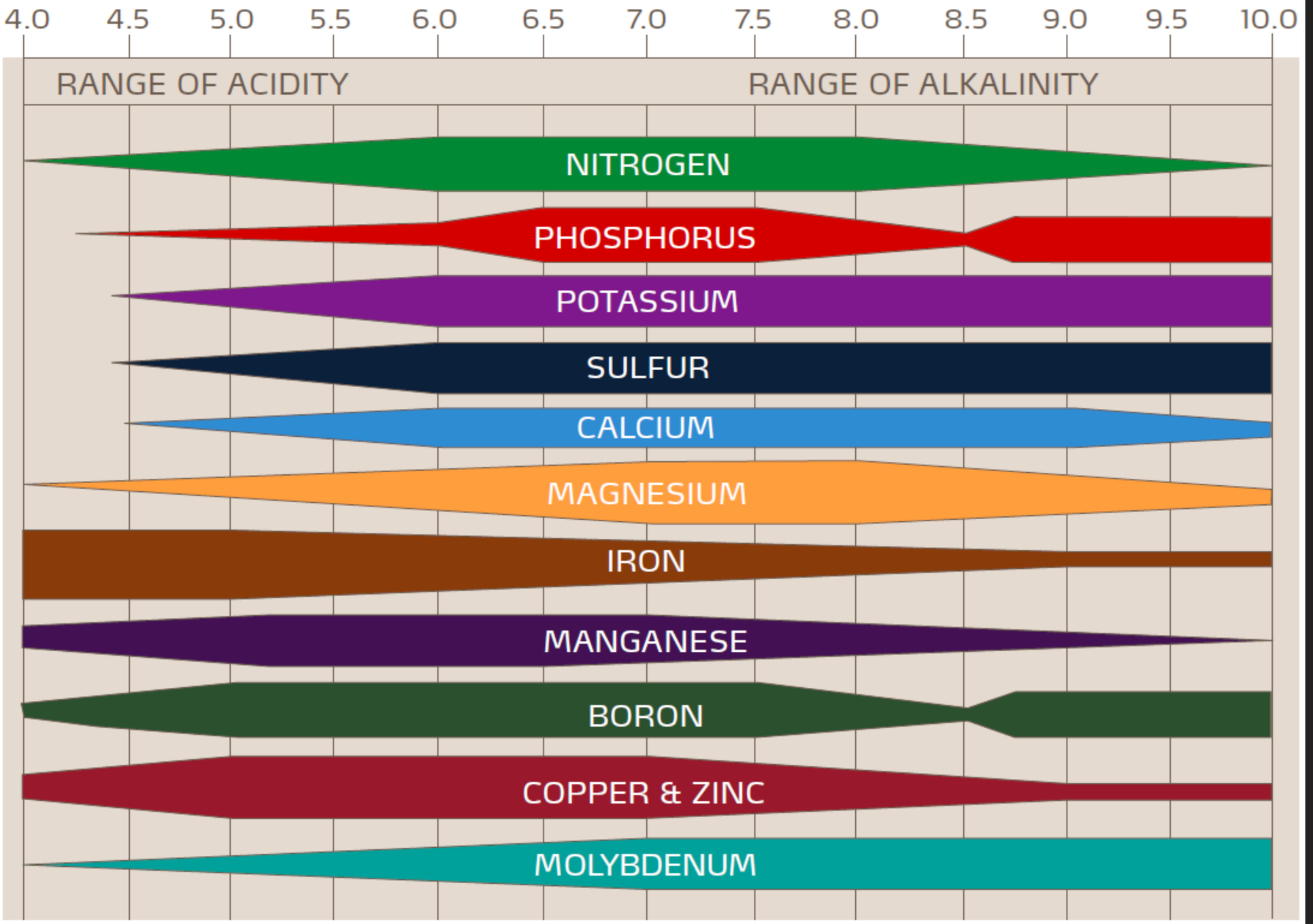
Micronutrients: B, Zn, Cu, Mn, Fe, Cl, Ni

Soil Health 101 - Important Factors

★pH

- Apples do best in slightly acidic soils 5.8 - 7.0
- Lime to raise pH
- Sulfur to lower pH
- Pears 6.0 -7.0

The Influence of Soil pH on Nutrient Availability



Soil Health 101 - Important Factors

★Organic Matter
- Increases Cation Exchange Capacity (CEC) in soil
- Increases water holding capacity
- Improves poor soil types (ie Clay)
- Ideal 3-6%

Soil Health 101 - Other Factors

★Soil Type (Sand? Clay?)
★Beneficial organisms (ie Mycorrhizae)
★Water holding capacity
★Compaction

Crop Monitoring Program

APPLES

Log In #4461701

Above Optimal | Optimal | Warning | Low

[redacted]

Nitrogen (%)

S-P	Date	%N	%P	%K	%Ca	%Mg	Zn	B	Fe	Mn	Cu	%S	%Na	%Cl
Optimal Zone					1.8	0.5	30	40	100	35	8	0.3	0.7	1.1
1														
2														
3														
4														
5														
6														
7	6/21/24	2.46	0.39	1.80	0.95	0.34	11	25	107	50	6	0.17	0.01	0.05
8														
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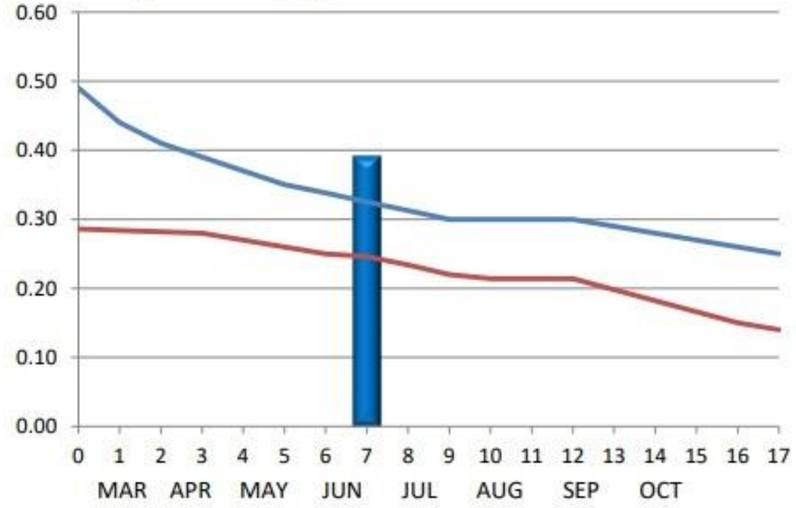
17														

Phosphorus (%)



Potassium (%)

Soil Analysis

AgSource LABORATORIES

Submitted by: **UMC00050**

CPS TANGENT / LINDSAY, ASHLEY
32092 OLD HWY 34
TANGENT, OR 97389

Submitted for:

PLEASANT VALLEY CIDER APPLES

Purchase Order No.: **S8917**

Information Sheet #: **S8917**

Laboratory Sample #: **BJ14765**

Field Id: **EAST COMPOSIT**

Crop: **APPLE**

Variety: **CIDER APPLE**

Date Processed: **10/31/2018**

Date Received: **10/30/2018**

Soil Analysis Report

Lab No.	Sample Id	Sample Depth	pH	BpH	SS mmhos	OM %	Ex Carb	Bray P ppm	Olsen P ppm	Ammonium Acetate K ppm	Ammonium Acetate Mg meq	Ammonium Acetate Ca meq	Ammonium Acetate Na meq	NO3 N lb/a	NH4 N lb/a	S ppm	B ppm	Zn ppm	Mn ppm	Cu ppm	Fe ppm	Al ppm	Cl ppm	Est. CEC	Base Saturation H %	Base Saturation K %	Base Saturation Mg %	Base Saturation Ca %	Base Saturation Na %
BJ14765	EAST COMPOSIT	18	4.9	6.2	0.1	3.7	NONE	8		151	3.3	8.3	0.12	35	52	26.0	0.2	0.8	56	1.5	77			21.1	42.7	1.8	15.5	39.4	0.6

Cover Crop Species - What do they do?

★Legumes (clover, peas, vetch, etc) : Capture nitrogen (N^2) and convert to a form plants can readily use, Nitrate (NO^3)

★Brassicas (mustards, turnips, radish, etc): Recycles nutrients into readily available forms. Biofungicide for certain nematodes

Cover Crop Species - What do they do?

★Grasses (rye, fescue, bent, etc): Fast growing, excellent erosion control, increases water holding capacity and livestock forage

★Cereals (oats, barley, wheat, etc): Increase biomass, cold tolerant, and livestock forage

Other Cover Crop Species

★Sorghum
★Alfalfa
★Sunn Hemp
★Phacelia
★Borage
★Natives

Native Plants

Camas in the PNW provides early season pollen for pollinators like Mason Bees!

Native Plants

Lupines are part of the Legume family (Nitrogen fixing). They also are important plants for Native Butterflies.

Primary Cover Crop Benefits

★Weed Suppression
- Fast growing grasses are excellent!

★Increases Organic Matter
- Cereals and brassicas create mass

★Increases Biomass
- Improves poor soil types over time

★Prevents Erosion

★Scavenges and Converts Nutrients

Secondary Cover Crop Benefits

- ★Reduces heat on the orchard floor
- ★Reduces nutrient leaching
- ★Reduces CO2 from the atmosphere
- ★Forage for wildlife or livestock
  - ○ Certain cover crops can be used for hay
- ★Flowers promote pollinator habitats

Cover Crop Mix Examples

★Increasing Biomass

- Annual Ryegrass (20-40%)
- Wheat or Triticale (20-30%)
- Oats (10-20%)
- Turnips (5-10%)
- Clover (3-5%)

Cover Crop Mix Examples

★Increasing Nutrients (Nitrogen and Potassium)

- Perennial Rye or Fescue (30%)
- Clovers (5-10%)
- Turnips (5-10%)
- Hairy Vetch (5-10%)
- Winter Peas (5-10%)

Cover Crop Mix Examples

★Compaction, Hard Soils or Nematodes

- Turnips (20%)
- Radish (10-20%)
- Clover (5-10%)
- Tall Fescue (20-30%)

Cover Crop Mix Examples

★Erosion Control (FAST Growing, Thick Rootmass)
- Annual Ryegrass (50-100%)
- Tall Fescues (50-100%)
- Fine Fescues (50-100%)

★High Traffic Areas (Headlands, Barns, Paths)
- Turf Fescues (50-100%)
- Perennial Ryegrass (50-100%)

Cover Crop Mix Examples

★Forage and Pasture Blend
- Annual Ryegrass
- Oats
- Triticale
- Perennial Ryegrass
- Vetch/Clover (too much can cause bloat)

Avoid Endophyte potential in Tall Fescues

10 Year Study 2015-2025 - PVCA Results

Study Parameters

★Soil depth tests performed at 18-24 inches every 2 years
★Full laboratory analysis of pH, OM, CEC, Nutrients and Base Saturation
★Comparison on pH and Nutrients = not possible due to other amendments

10 Year Cover Crop Study 2015-2025

★2015 - 1st Soil Sample on Fallow pasture
★2016 - Aggressive tillage practices. Cover planted in Fall (annual rye, triticale, clover, brassicas, etc)
★2017 - Allowed cover crop to seed. Mowed and reduced tillage practices.
★2018 - Allowed cover crop to seed. Mowed and reduced tillage practices. Re-seeded (added oats, barley, wild flowers). Soil Sample.

10 Year Cover Crop Study 2015-2025

★2019 - Allowed cover crop to seed. Mowed.
★2020 - Mowed and reduced tillage practices. Re-seeded (added in perennials). Soil sample.
★2021- Hay'd. No tillage.
★2022 - Hay'd. No tillage. Soil Sample.
★2023 - Hay'd. Reseed (wild flowers).
★2024 - Mowed. Soil Sample.
★2025 - Maybe hay?
★2026 - Till and reseed for weeds! Soil Sample.

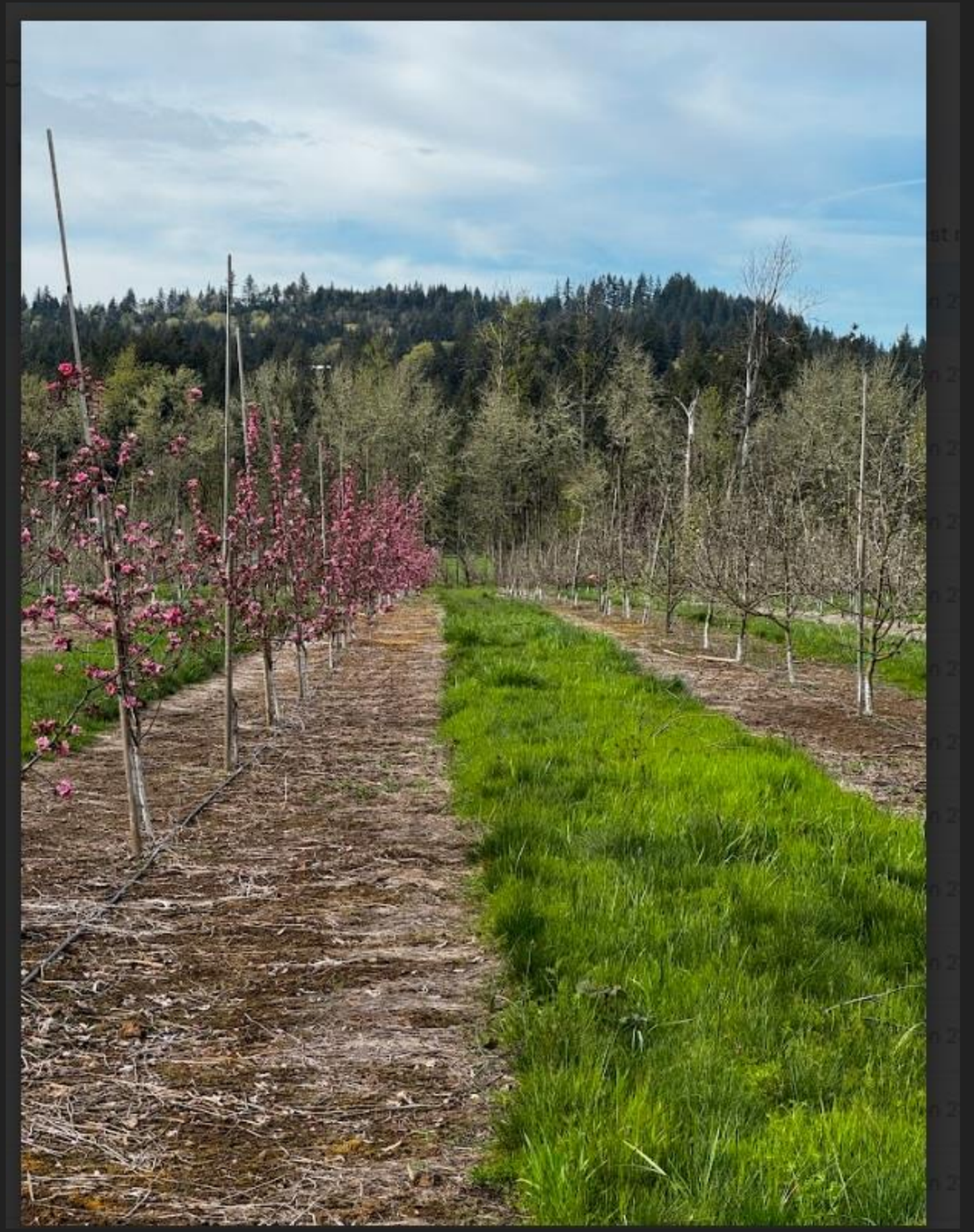
10 Year Cover Crop Study 2015-2025

PVCA Results

★Increased Organic Matter from 2.8% to 4.5%
★Increased Cation Exchange Rate
★Increased Pollinator Habitats
- Orchard is now a Breeding Site for Mason Bees through OSU Extension Program

Acknowledgments

- USDA NRCS - Grant Recipient Cover Crop Program
- Chemeketa - Northwest Wine Studies Center
- Jolly Farmer Cover Crops - Corvallis, Oregon
- Oregon State University and Extension
- Washington State University
- Cornell University Cooperative Extension



Thank you!

Questions?

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