



# Vineyard Soil Management Throughout the Season

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Soil  
Why it is important?

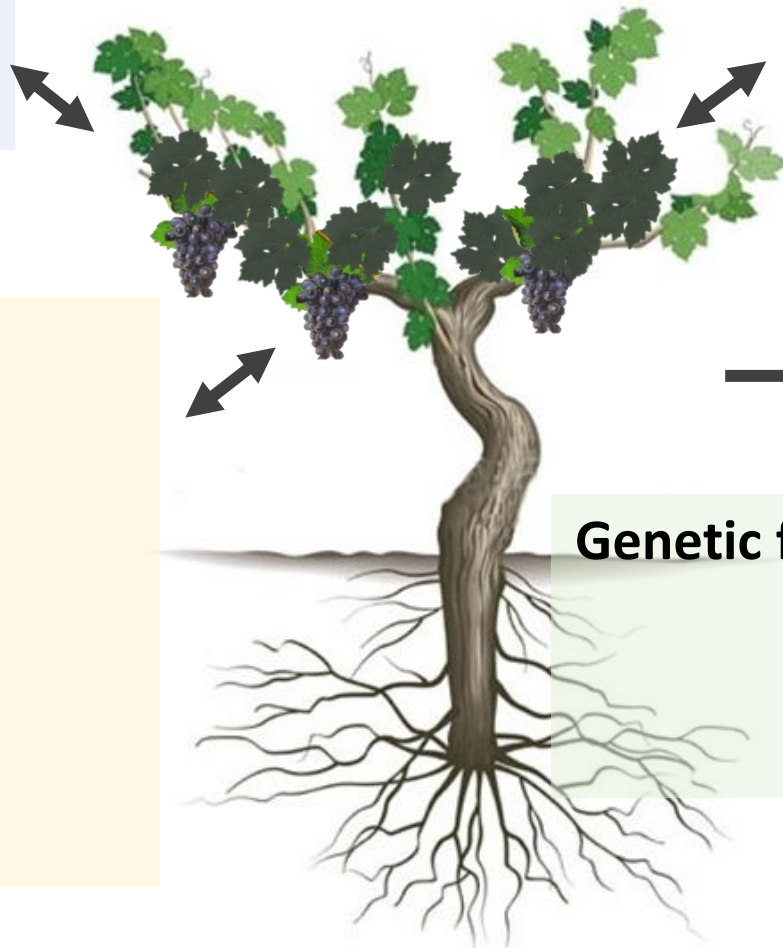
# Terroir

Climate

Human factor

Soil

Genetic factors



# Terroir

**Climate**

**Human factor**

**Soil**

Type & Texture

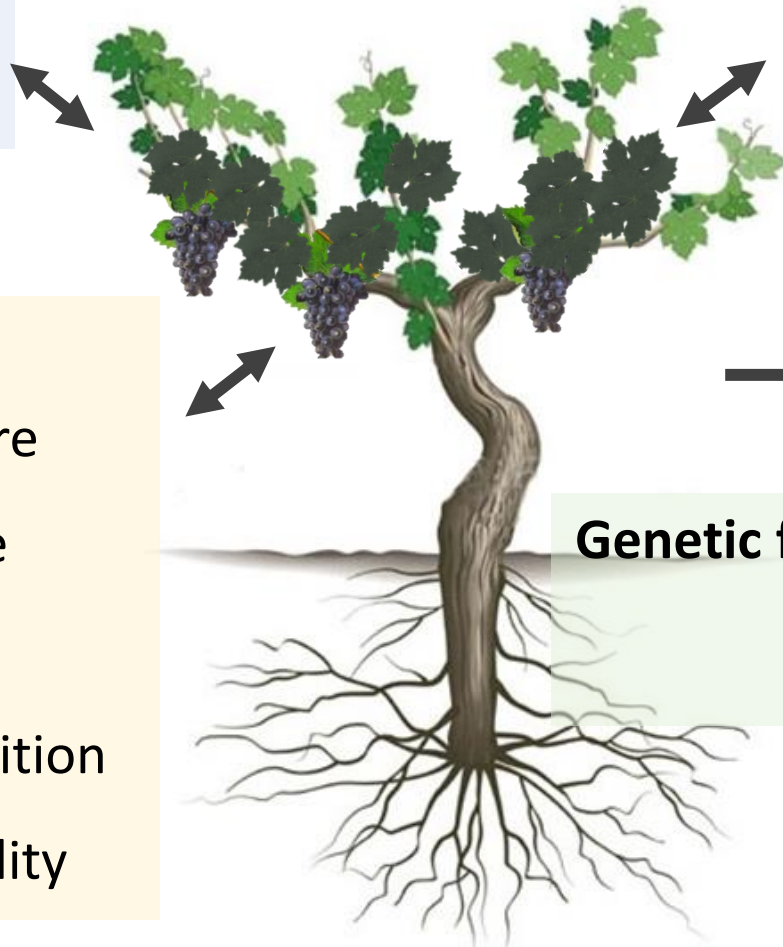
Pedoclimate

Color

Mineral composition

Water availability

**Genetic factors**





# No single ideal soil to produce quality grapes

## **Soil**

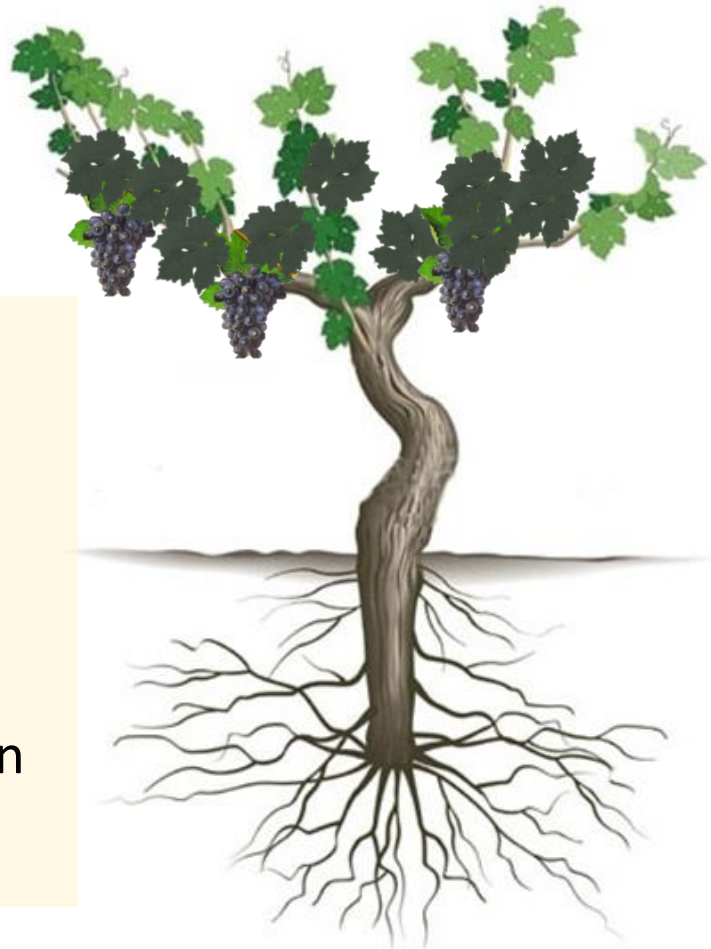
Type & Texture

Pedoclimate

Color

Mineral composition

Water availability



While very high-quality wines are grown on different soils, it is impossible to define the ideal soil for fine wines.

Understanding your vineyard soil characteristics  
is important

(texture, water holding capacity, fertility, color...)

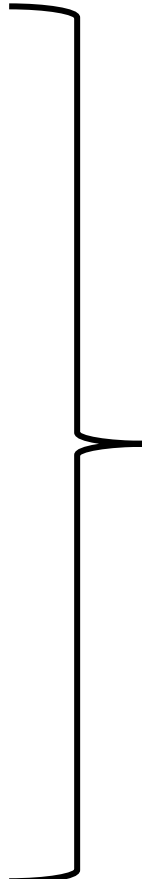


Appropriate strategies for soil management

# Optimal soil management is important

Soil management can influence:

- Root depth
- Water availability
- Mineral composition
- Temperature
- Structure
- Disease and pest pressure



Influence on vineyard health  
and grape and wine quality

# Key challenges in managing vineyard soils





# Erosion

- **Not just if you have a slope**
  - wind, rain, human practices
- **Accelerated by disturbing the soil (i.e. tillage) or no cover**
- **Major threat to vineyard health & productivity**





# Compaction

- Every pass in the vineyard increases compaction
  - decreased infiltration of water
  - decreased aeration
    - roots & microbes need O<sub>2</sub>
  - continuous tillage can create a clay pan
- All leads to decrease in sustainable productivity



Department of Agriculture and Food, Western Australia



# Chemicals

- Overapplication of plant nutrients and pesticides.
- Accumulation of salts, excess nutrients and chemicals, and toxic chemicals.
- Use chemicals wisely and when needed.



# Weeds in Vineyards

**Weed = a plant growing where it doesn't belong.**

**Primary obstacle to overcome during establishment**

- Water competition
- Nutrient competition - N
- Sunlight
- Reduced spray efficacy
- Harbor pests & diseases





# Weeds influence vine growth

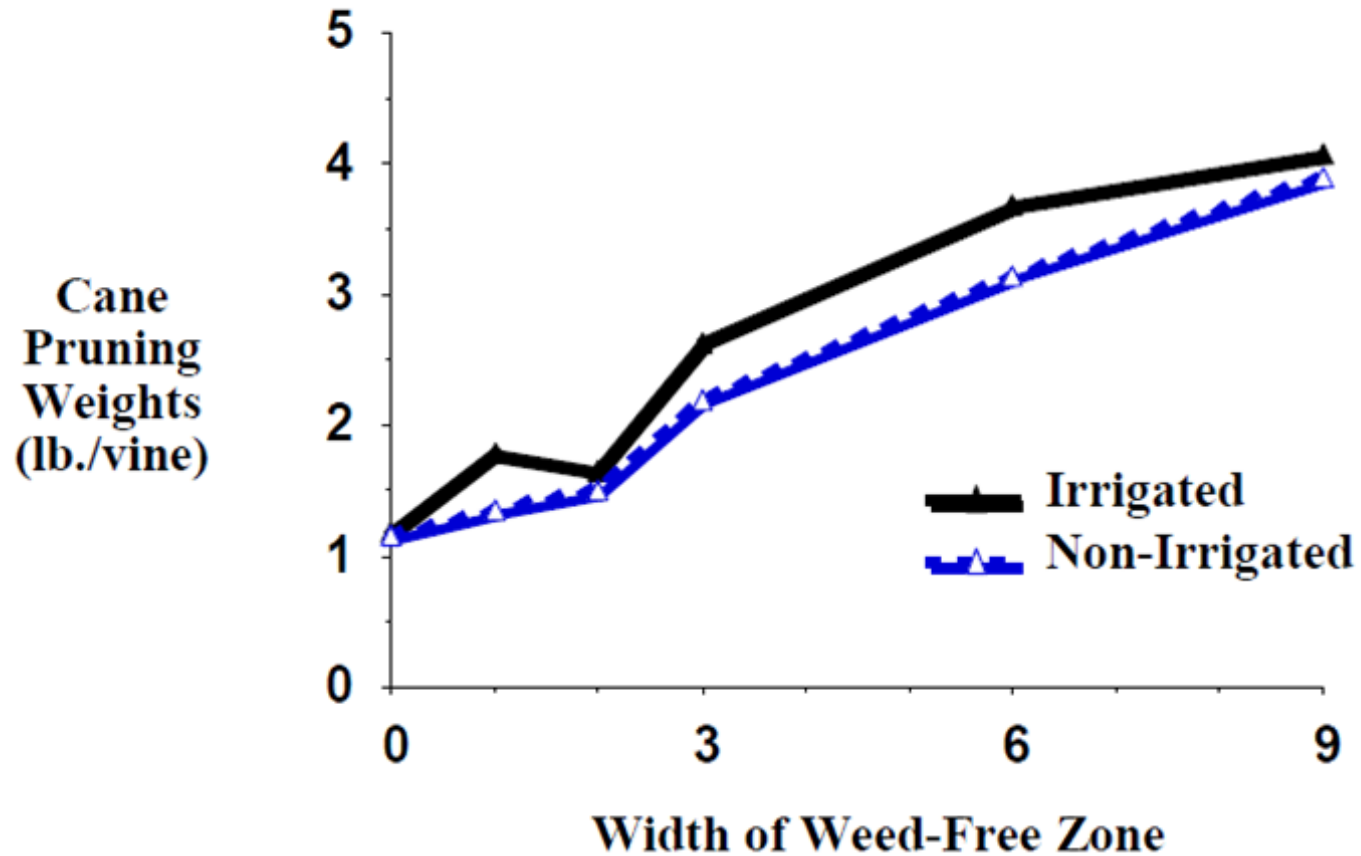


Figure 2. Effect of width of weed-free zone and irrigation on 1998 cane pruning weight (courtesy Alan Lakso, Cornell University ).

# Control weeds in new planted vineyard!!



# Ultimate goals in soil management

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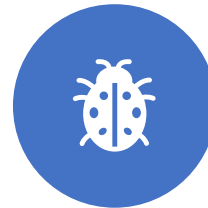
Sound soil structure  
(erosion, infiltration,  
compaction...)



Competing  
vegetation under  
control



Sufficient soil  
nutrients and  
moisture



Healthy population,  
diversity, and activity  
of soil microbes



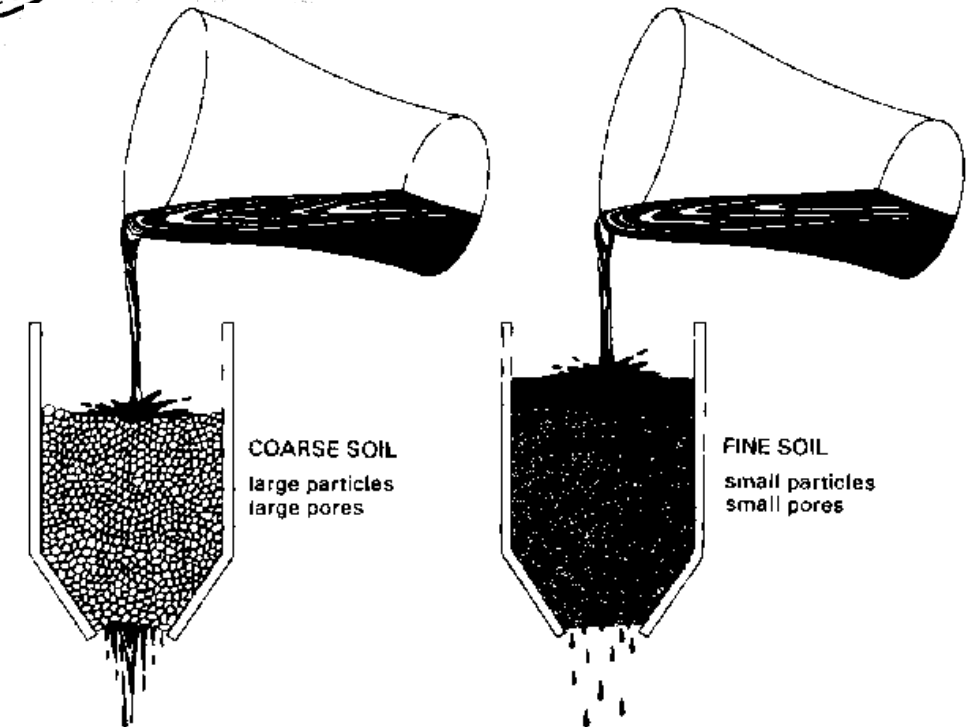
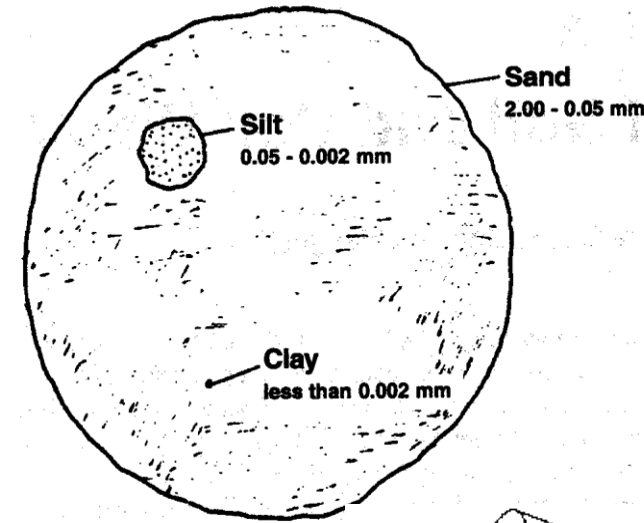
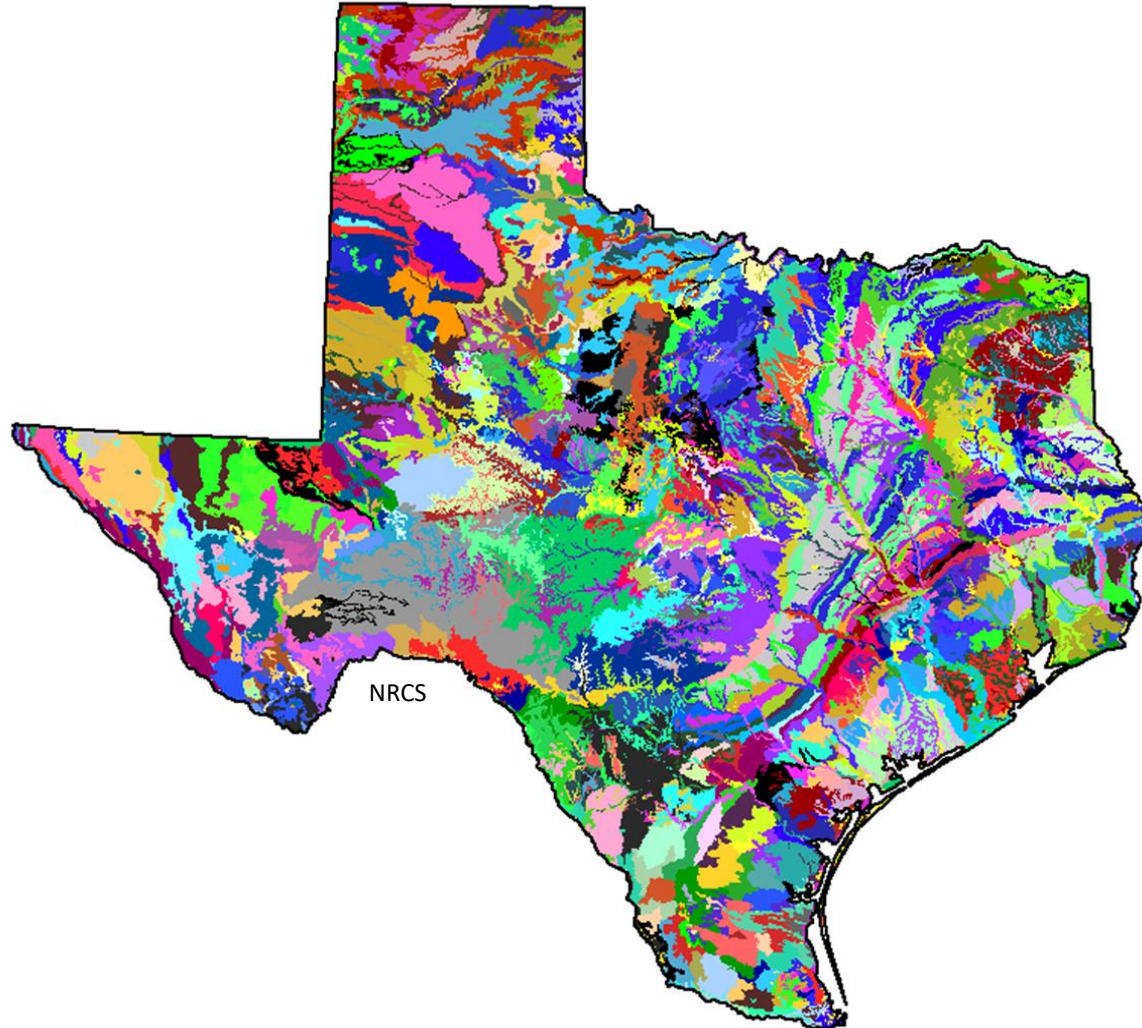
Minimized pest &  
disease habitat



Biodiversity in the  
vineyard



# Texas Soil Diversity





# What is considered part of a vineyard floor management?

- In row middle  
(between rows,  
between trellis)
- Under trellis\*  
(in-row, under-row)
- Headlands

\*3-4 feet swatch under the trellis where the vines are planted.





# Vineyard Soil Management Options



Between trellis  
Shallow tillage  
Under trellis  
Clean



Between trellis  
Vegetation (native or sowed)  
Under trellis  
Clean



Between trellis  
Vegetation  
Under trellis  
Vegetation



Between trellis  
Alternate tillage-vegetation  
Under trellis  
Clean

# Vineyard Soil Management Options

How to read the table: example: If the “soil fertility is poor” → use 1<sup>st</sup> plan

	<u>Between trellis</u> Shallow tillage <u>Under trellis</u> Clean	<u>Between trellis</u> Vegetation (local or sowed) <u>Under trellis</u> Clean	<u>Between trellis</u> Vegetation <u>Under trellis</u> Vegetation	<u>Between trellis</u> Alternate tillage-vegetation <u>Under trellis</u> Clean
Soil fertility	Poor	Poor to high	High	Intermediate
Soil water holding capacity	Low	High	High	Intermediate
Vine age	New plantings	New plantings and/or mature	Mature	New plantings and/or mature
Vine vigor	Low	Low to high	High	Low to high
Rootstock vigor	Low	Low to high	High	Low to high
Stage	In-season	Dormancy and/or in-season	Dormancy and/or in-season	In-season
Water availability (rain/irrigation)	Low	Good	Good	Intermediate
Erosion Potential	Low	Low to moderate	High	Low to moderate



# Managing Vineyard Floor





# Pre-plant: 1 year-out

## 2 strategies of management

- Entire vineyard
- Strips under vines

## Cultural

Light tillage & disking to remove:

Tree roots

Perennial crops

## Chemical

Pre-plant applications of glyphosate in summer and fall

*Always follow the label – it's the law*



# Planting and Establishment

## Goal

- Weed free entire vineyard.
- Weed-free strip under trellis (3-4').
  - Larger the weed free strip the less competition exists.
- Young vines most sensitive to weed pressure.
- Inadequate control = poor vine growth and productivity.

*“Mowing row centers and not addressing weeds under the trellis accomplishes little” – Jim Kamas*





# Established Vineyard

(4<sup>th</sup> leaf+)



Between trellis  
Shallow tillage  
Under trellis  
Clean



Between trellis  
Vegetation (native or sowed)  
Under trellis  
Clean



Between trellis  
Vegetation  
Under trellis  
Vegetation



Between trellis  
Alternate tillage-vegetation  
Under trellis  
Clean

# How to attain your goals in vineyard floor management?

- Mechanical control
  - By hand
  - Mechanical tillage
- Weed eating
- Mulching
- Weed blocks
- Chemical control – Herbicides
- Cover cropping



# Mechanical control – By hand

## Advantages

- Simple tools
- Hobby vineyards
- Persistent areas

## Disadvantages

- Time
- Cost
- Labor/morale
- Perform every 2-4 weeks during season



# Mechanical tillage

Can be applied both under vine and row middles

## Disadvantages

Vine injury #1 - disease (ex. crown gall)

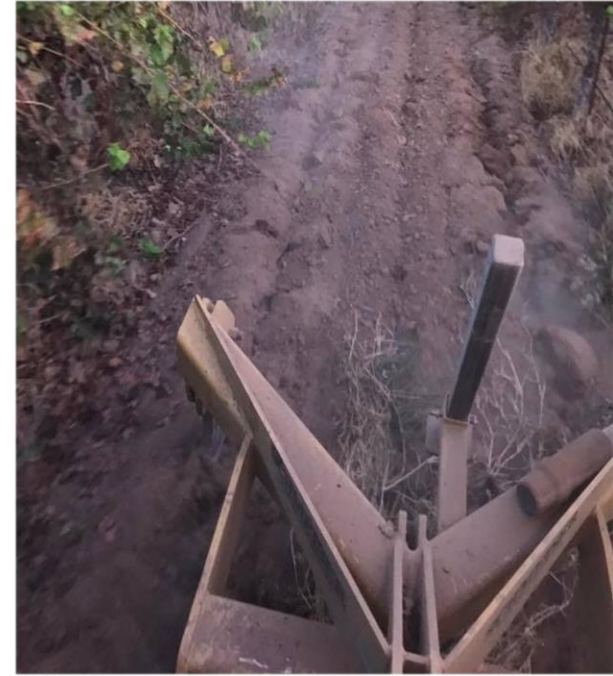
Disturbing soil structure

- Loss of OM & fertility over time

- Decreased microbial activity

Poor aeration and water infiltration/holding capacity in the long run

Initial cost \$\$\$





# Weed eating

## Advantages

Simple tool

Faster than hand hoeing

Affordable

## Disadvantages

High risk of trunk injury even with grow tubes

Resist the temptation!





# Mulching under trellis

## Advantages

Conserves soil moisture

Weed control (initially)

Deposition of OM

## Disadvantages

Costly

- Trucking, labor, mulch
- \$4,000/acre+

Conserves soil moisture

If you can use it: 4" layer; maintained every year



# Weed block

## Advantages

- Excellent weed control
- Long lasting
- Erosion control

## Disadvantages

- Costly
- Difficult to install
- Labor intensive
- Not permanent





# Chemical control

## Why use herbicides?

Often inexpensive

High level of control

Easy to apply

Quick to apply

Requires minimal equipment





# Sprayer options

Backpack sprayer

Boom sprayer

Over the row boom sprayer



Designated Herbicide Sprayer



# Application of herbicides

Should use in addition to cultural controls

Know what product to use and when

# Cover cropping

- Does not compete excessively and adds surface OM
- Improve soil structure
- Increase mineral fertility
- Suppress weeds
- Minimize erosion and run-off
- Soften tractor compaction
- Habitat for beneficial insects and predators
- Increase biological diversity and activity





# Cover cropping

## Options

Cereals & grasses

Legumes

Brassicas (Mustards and forage radish)

Common in Texas: elbon cereal rye, triticale,  
buffalo grass + blue grama, winter ryegrass

Legumes often avoided in fertile soils







# Novel technologies

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# What vineyard soil look like?

Determine the goals of your system





# Questions?

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