Keys to Successful Olive Orchard Establishment

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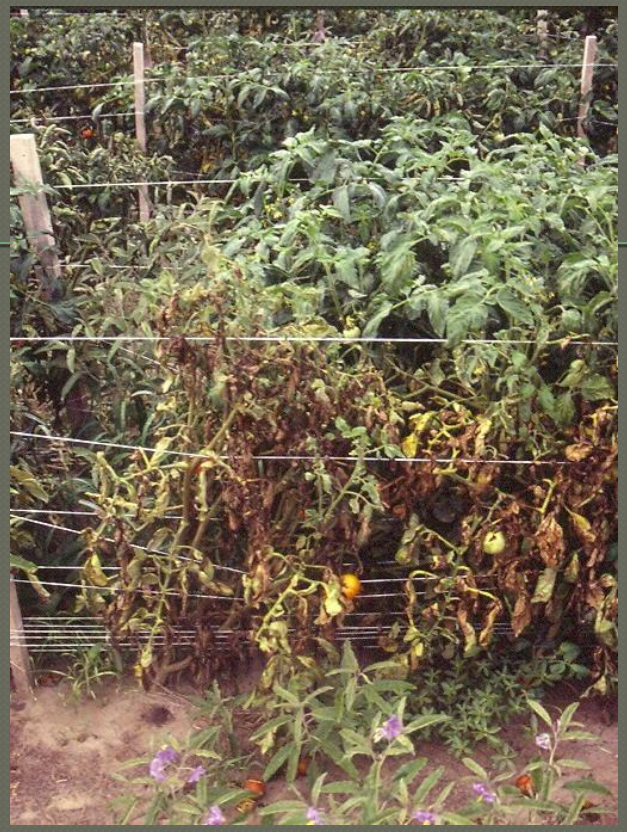
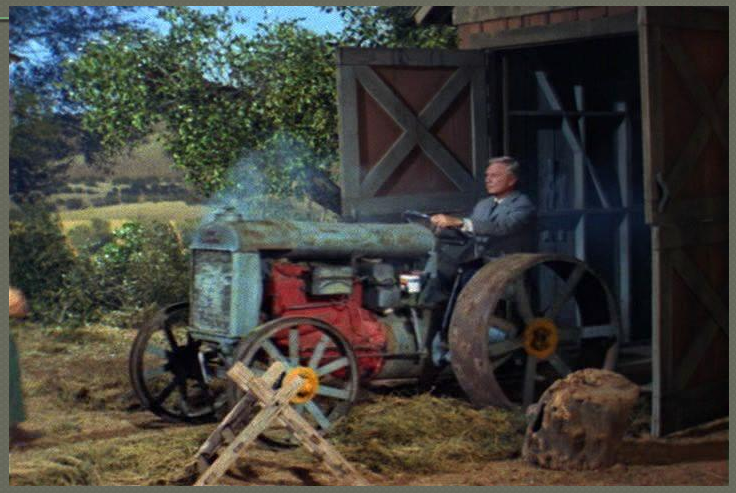


Annual Crops vs. Perennial Crops

Consider Enterprise Carefully

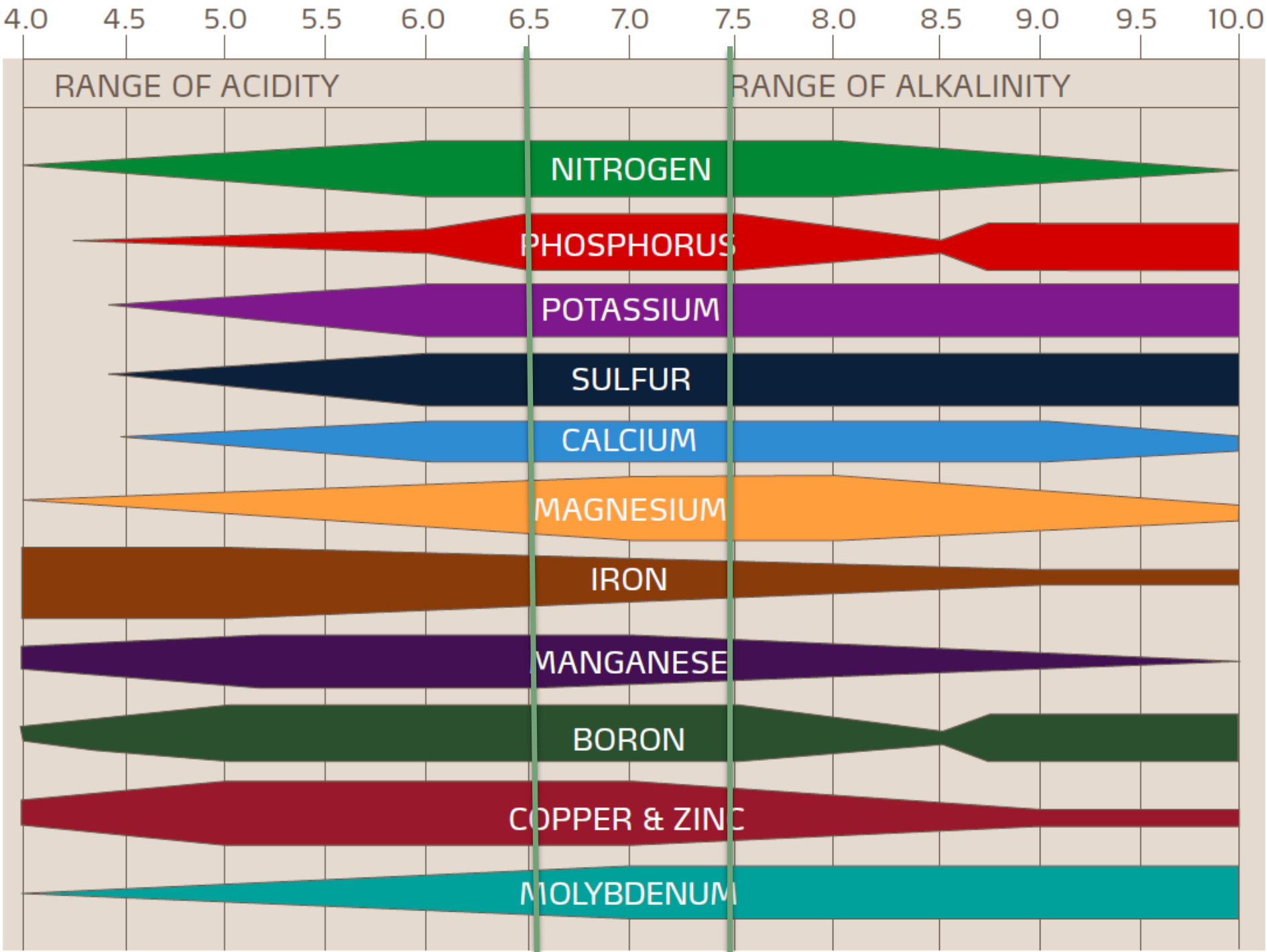
- Orchard Size?
  - Aesthetical Planting?
  - Small Acreage?
  - Commercial Venture?
- Have You Ever Farmed Before?
  - Make Your Mistakes on a Small Scale
  - It Takes Far More Time Than You Can Imagine
  - It Costs More Money Than You Think It Will
  - Remember Murphy's Law and O'Leary's Corollary



Do I Need To Take A Soil Sample?

A Soil Sample….

- **Will Tell You**
  - Soil pH
  - Soil Nutrient Composition
- **Will Not Tell You**
  - Soil Depth
  - Soil Drainage
  - Presence of Soil Borne Pathogens
  - Presence of Residual Chemicals
  - Suitability to Grow Olives

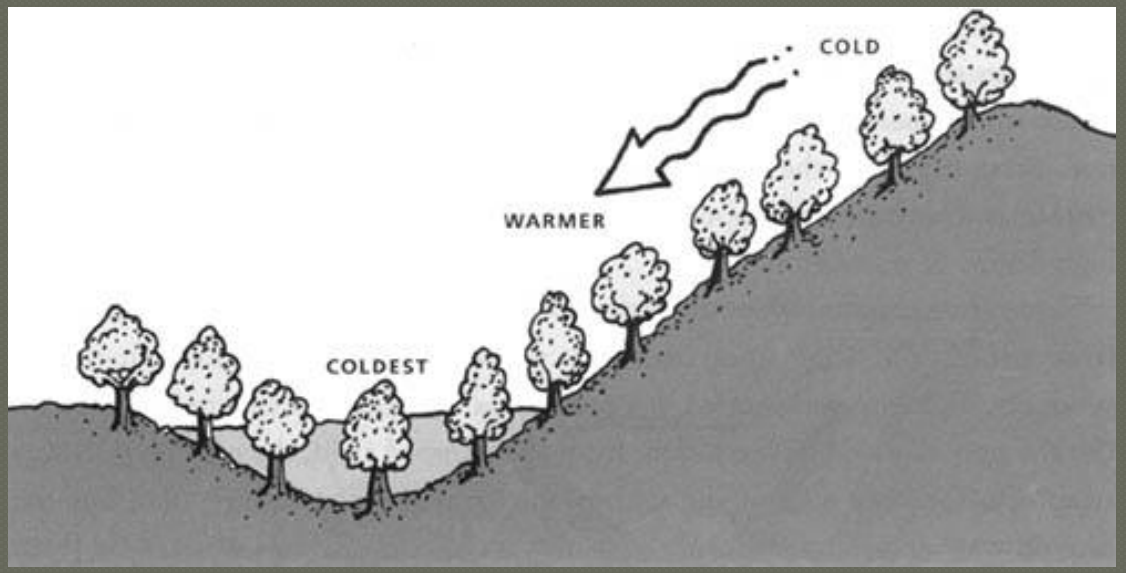

4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0
RANGE OF ACIDITY
RANGE OF ALKALINITY
NITROGEN
PHOSPHORUS
POTASSIUM
SULFUR
CALCIUM
MAGNESIUM
IRON
MANGANESE
BORON
COPPER & ZINC
MOLYBDENUM

Best Soils

Be Realistic With Your Expectations

Site Selection

- **Water Drainage**
  - Surface Drainage (Slope)
  - Internal Drainage (Percolation Test)
- **Air Drainage**
  - Avoiding Frost / Freeze Pockets
  - Maximizing Air Movement to Reduce Incidence And Severity of Disease Pressure

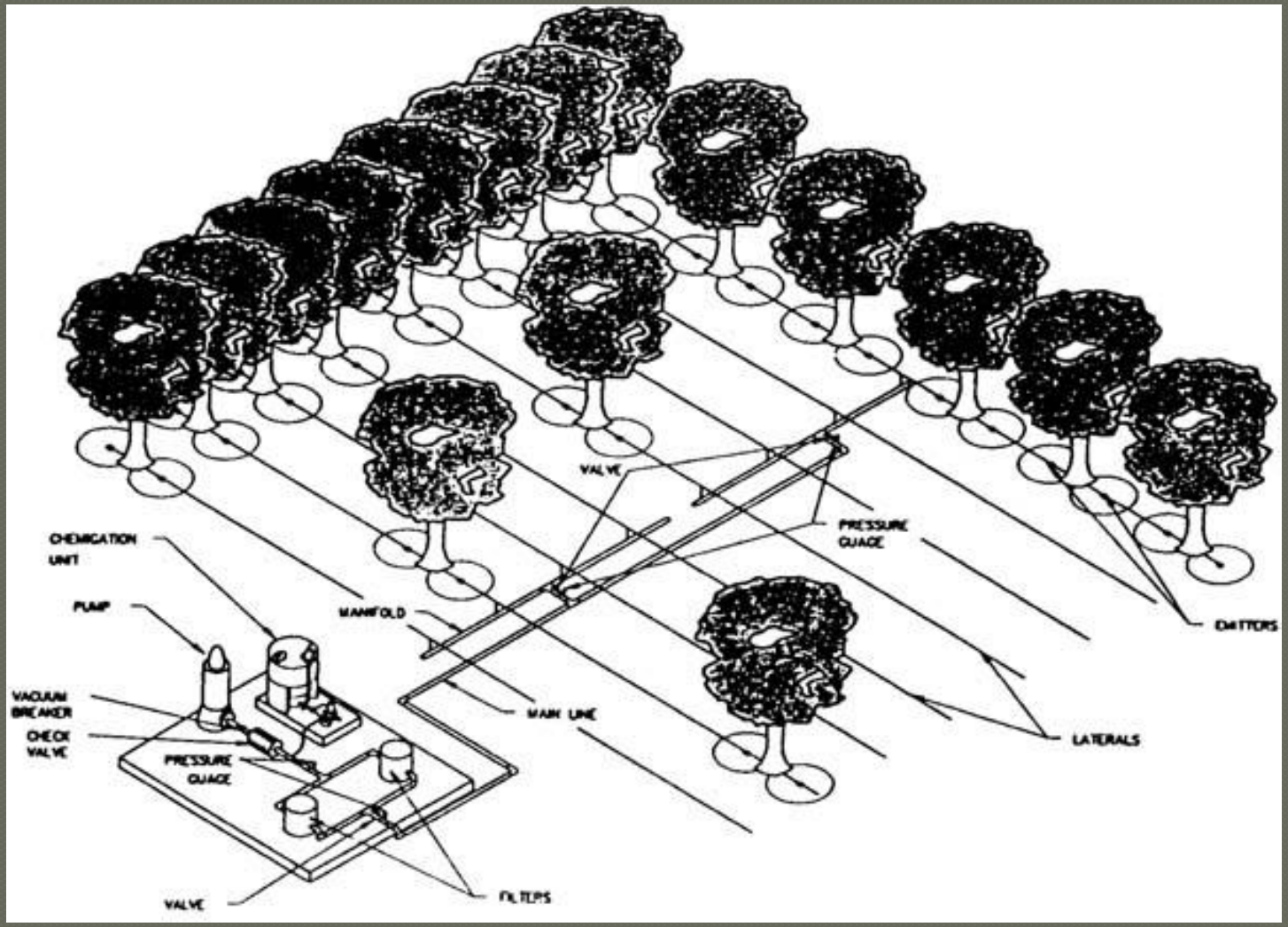


Site Selection is the Greatest Tool A Grower Has to Mitigate Cold Temperature Injury

Water Needs

- California Growers Look For 10gpm/acre of Orchard
- Mature Orchard Needs ~1.5 to 2 Acre Feet Per Year
- Water Quality- Sodium Absorption Ratio < 7

Drip Irrigation Design



Drip Irrigation is Most Efficient Method of Water Application

- ½” Polyethylene Lines Above Ground
- Inject Acid to Keep Emitters Clean
- Only Hits a Small Percentage of Root Zone
- Emitter Flow Varies

Do You Need to Rip Your Site?

- May Be Needed if Plowpan or Hardpan is Present
- May Bring Additional Weed Seeds to the Soil Surface
- Do NOT “Turn” Soil With a Turning Plow
- Rip Soil When Dry, Not Wet

Removal of Existing Vegetation

- Disk to level field and for initial control of germinating annual Weeds
- Successive Glyphosate applications in June-July, then again September-October

Keys to Effective Use of Glyphosate

- Late Season Applications Are More Effective In Controlling Perennial Vegetation
- Weeds More Easily Killed When Not Under Drought Stress
- Apply Glyphosate at Low Volume (7-15 gallons per Acre)
- Add Spray - Grade Ammonium Sulfate to Tank (17#/100 gallons of water)

Mesquite

- Remedy® (triclopyr) Half life of 30 days, not strongly adsorbed, rapidly degraded by light and in water
- Reclaim ® (clopyralid) Half life 40-70 days, not degraded by light or in water. Microbial degradation only. Warning about residual damage to crops

Do I Need A Berm?

Bermed Rows

- Highly Recommended In All Areas
- Will Assist in Keeping Some Roots Out of Saturated Soil Until Drainage Can Take Place

Constructing Berms

Drag to Smooth Out Berm

Do I Need a Trellis?

- Standard and Moderately High Density Plantings Generally Grown As Freestanding Trees
- Trellis Used to Support Trees During Mechanical Harvesting / Hedging

Cover Crop Establishment

Benefits of Cover Crops

- Additional Organic Matter Additions
- Equipment Footing In Wet Weather
- Easily Killed With Glyphosate
  - Grow Mulch in Place
  - Additional Water & Nutrient Holding Capacity
  - Cools Soil Temperatures
  - Assists in Controlling Weeds

Timeline for Orchard Establishment

- 18 Months Before Planting- Control Any Brush on Property
- 15 Months Before Planting- Contact Nursery to Secure Plant Material
- 12 Months Before Planting- Initial Site Disking/Leveling
- 9 Months Before Planting- Establish Berms, First Glyphosate Application
- 7 Months Before Planting- Additional Glyphosate Planting

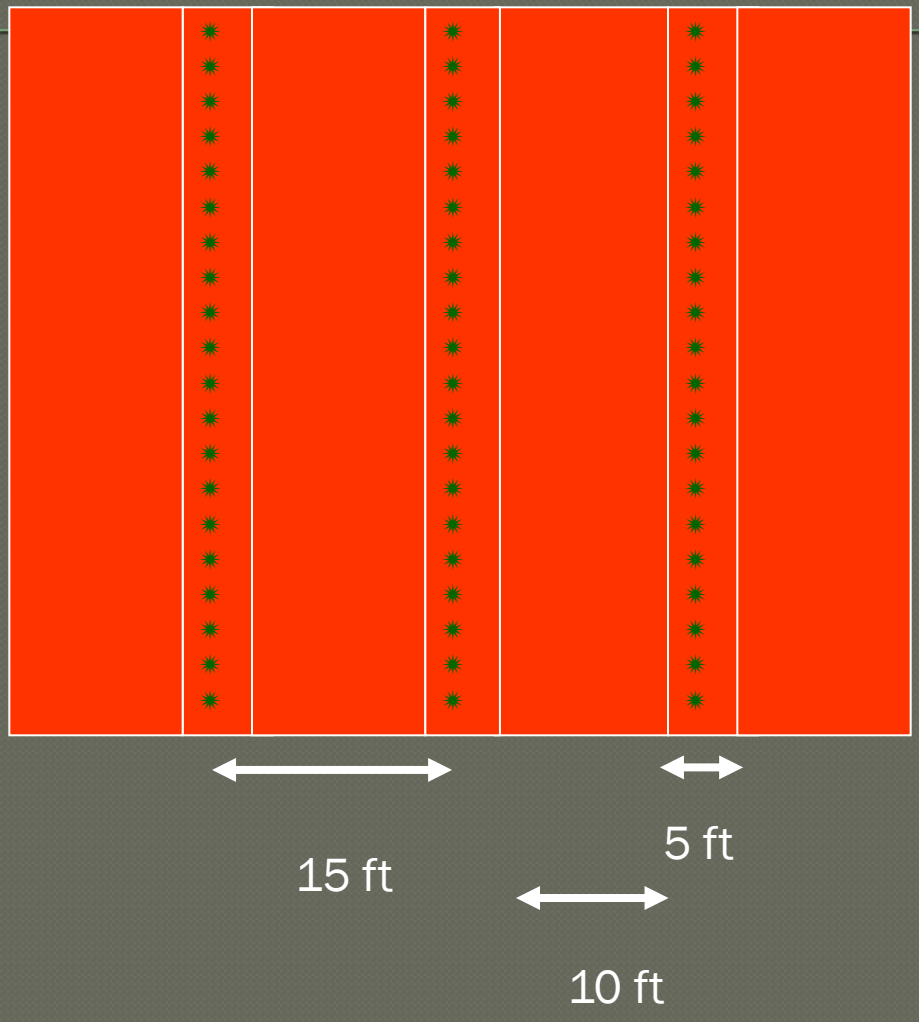
Timeline for Orchard Establishment

- 5 Months Before Planting- Establish Cover Crop
- 2 Months Before Planting- Install Irrigation System, Burn Down Cover Crop Down Tree Row
- 1 Week Before Planting- Pre-dig Holes
- Plant- Hand Water Trees After Planting

Managing Orchard Floors

- Managing Weeds In the Tree Row
  - Cultivation- Not recommended because of damage to root system and soil loss from erosion
  - Mulching- Many positive consequences, but labor intensive, expensive and may exacerbate soil-borne pathogen susceptibility
  - Post-emergence Herbicides- Glyphosate, Paraquat, Poast, Fusilade, & Venue*
  - Pre-emergence Herbicides- Many Choices

Effectively Applying Herbicides is a Matter of Matching Spray Volume to Area



If Rows are Spaced 15 ft apart
And
A Grower Chooses to Apply
Herbicide to a 5 ft. Band Under
The Row, The Grower is Treating
One Third of the Orchard Floor
In Other Words, In Three Acres
Of Orchard, One Acre Would Be
Treated

Post-emergence Herbicides Labeled In Olive Orchards

- Glyphosate- Safe to Applicator, No Soil Activity, Highly Translocated, Danger to Trees from Incidental Contact
- Paraquat- Extreme Danger to Applicator, No Soil Activity, Mildly Translocated, Will Burn Tissue That is Contacted, Restricted Use Material
- Sethoxydim (Poast), Fluazifop-p-butyl (Fusilade), Clethodim (Select Max)- Selective Grass Killers, Non-bearing Trees Only
- Carfentrazone (Shark)- Selective Broadleaf Killer- Non-bearing Trees Only

Venue Herbicide

- Labeled for Control of Broadleafed Weeds in Non-bearing and Bearing Olive Orchards
- Labeled for Sucker Control in Bearing and Non-bearing Olive Orchards
- Will Burn Back Green, Non-callused tissue

Pre-Emergence Herbicides- Bearing Olive Orchards

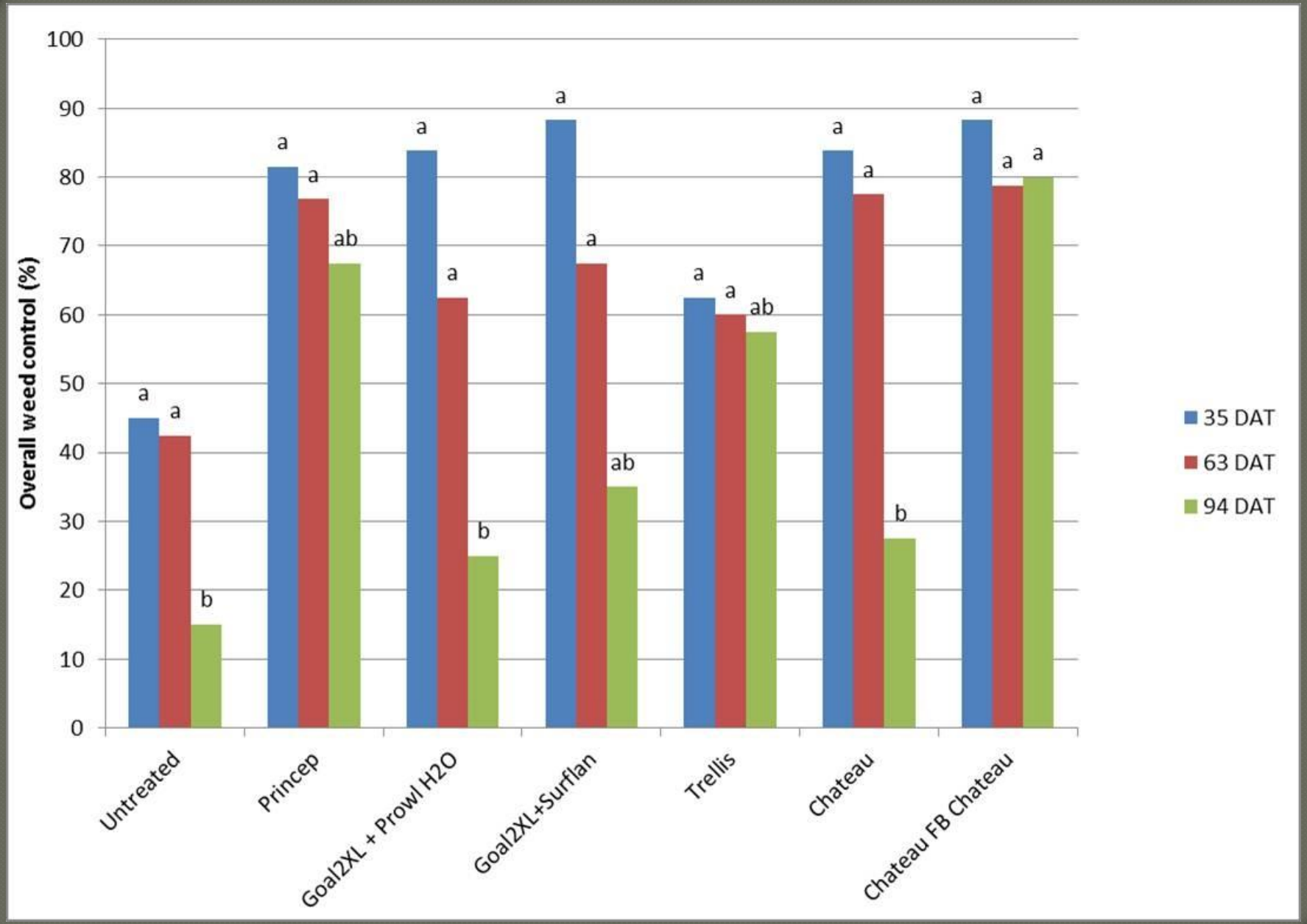
- Diuron (Karmex)- Urea Herbicide For Germinating Grasses. Labeled for Olive Trees at least 1 ½" in Diameter. Do Not Use on Soils with <1% Organic Matter
- Simizine (Princep, Caliber 90)- Triazine Herbicide Applied Between Harvest and Early Spring. Do Not Use on Trees Less Than One Year Old

Pre-Emergence Herbicides- Nonbearing Trees

- Flumioxazin (Chateau)- Apply Only After All Air Pockets Have Been Filled In Newly Planted Orchards. Excellent Control of Both Germinating Broadleaves and Grasses. Needs Rainfall Within 21 Days of Application
- Isoxaben (Galllery, Trellis)- Control of Germinating Broadleaves Only. Needs Rainfall Within 21 Days of Application

Pre-Emergence Herbicides- Nonbearing Trees

- Oryzalin (Surflan)- Trifluralin Herbicide Used to Control Germinating Grasses. Needs Rainfall Within 21 Days of Application. Very Safe, Must Be Applied to Bare Ground.
- Oxyflurofen (Goaltender)- Used to Control Germinating Broadleaves. Must Not Be Disturbed (tillage) Or Poor Control. Also Labeled for Bearing Trees. Some Postemergence Activity

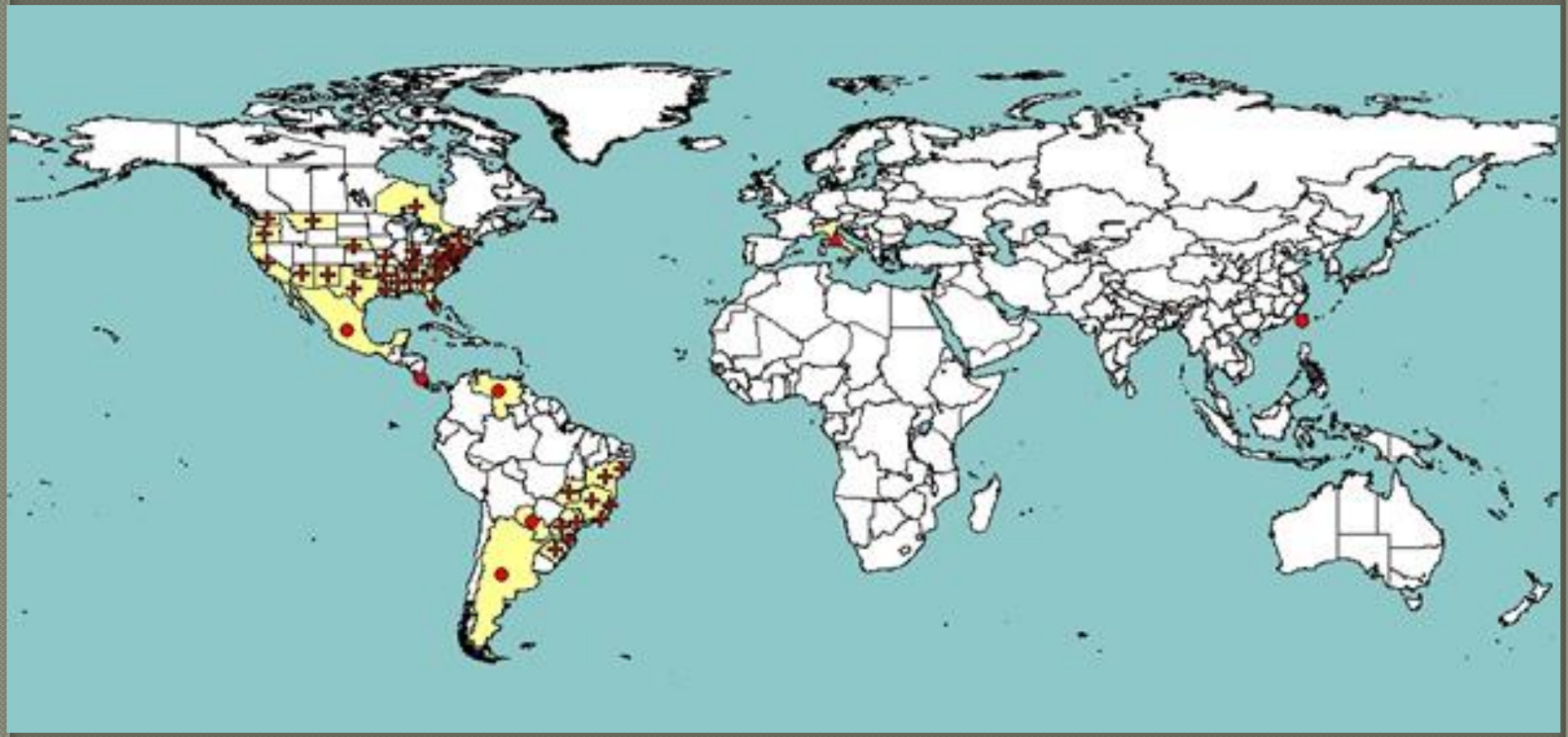

Overall weed control (%)
100
90
80
70
60
50
40
30
20
10
0
a
a
b
a
a
ab
a
a
b
a
a
ab
a
a
ab
a
a
b
a
a
a
Untreated
Princep
Goal2XL + Prowl H2O
Goal2XL+Surflan
Trellis
Chateau
Chateau FB Chateau
35 DAT
63 DAT
94 DAT

Herbicide Application Equipment

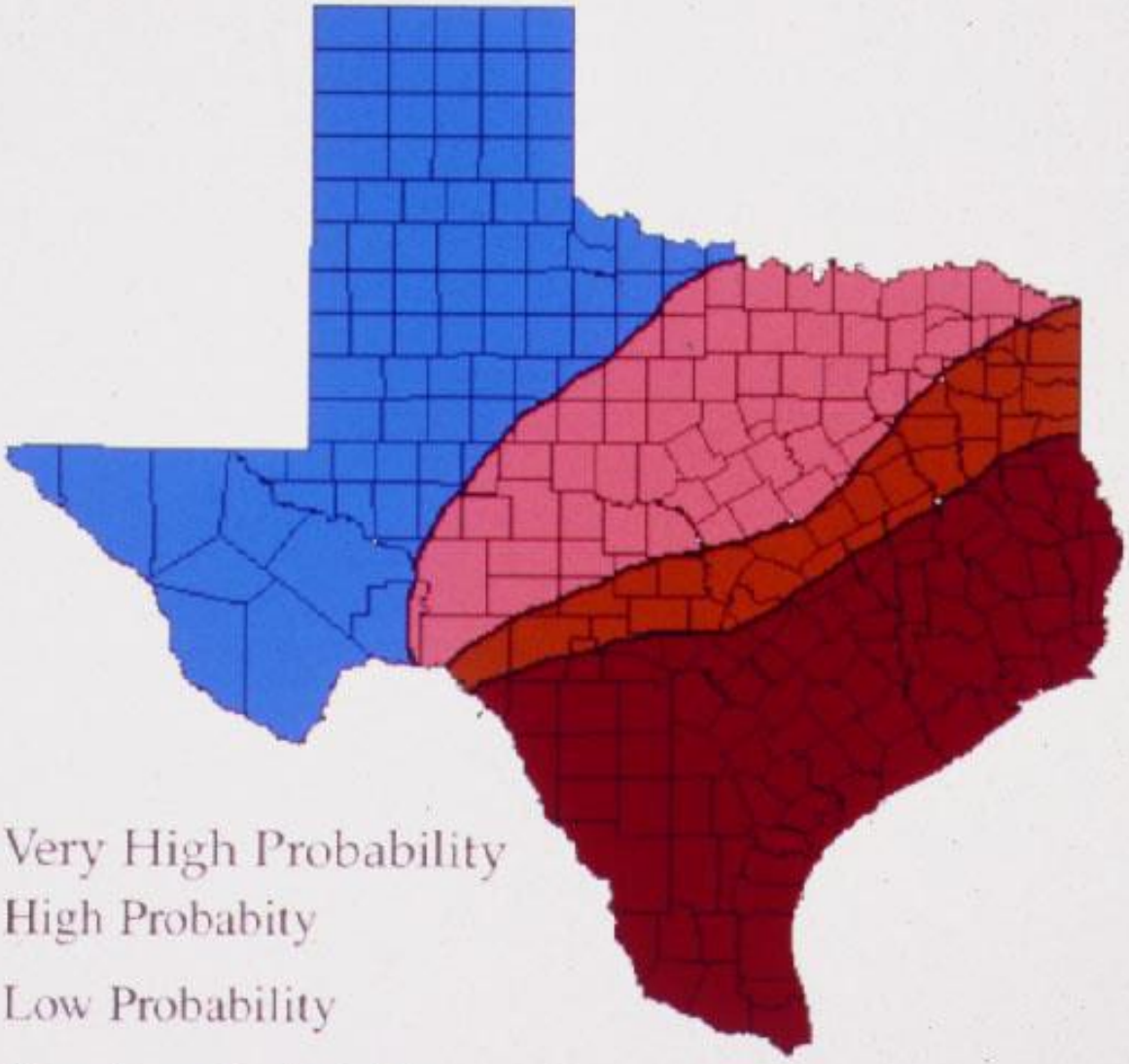
One Last Point to Ponder

- New Report of an Introduced Pathogen in Southern Italy That Has Infected and is Implicated in the Decline of 6000 Hectares of Olives
- Pathogen is *Xylella fastidiosa*, Native to Southeast Texas
- Also Recognized as Olive (Bacterial) Leaf Scorch in California

Xylella fastidiosa Known Range



Expected Probability of Pierce's Disease in Texas



Reasons for Optimism