

Fran Angerer



Alexander Valley Truffle Co.
Geyserville orchard



Truffle Dreams and Truffle Nightmares

Presentation Outline

- 1.0 Truffle questions to ask and thoughts to ponder.
- 2.0 Digging dirt and land preparation.
- 3.0 Planning and building out your orchard.
- 4.0 Equipment
- 5.0 Re-Inoculation
- 6.0 Bio-Security



Orchard Development Checklist

Preliminary Guidance for Establishing a New Truffle Orchard.

As early innovators of growing truffles in North America, NATGA grower members would like to suggest some guidelines to potential new growers to assist in decision making at the early stages of orchard development. The following list suggests some of the steps involved to consider in your exciting new adventure.

- 1. Establish a Budget**
 - A. Establish a start up budget.**
 - B. Plan for a yearly orchard maintenance budget. It may take 10 to 12 years before production.**
- 2. Evaluate Site Geography**
 - A. Identify planting area.**
 - B. Determine planting design .**
 - C. Layout planting irrigation and row spacing with adequate area for tractor maneuverability.**
 - D. Review and Identify target truffle type you would like to grow.**
 - E. Submit soil samples for chemical analysis.**
- 3. Consider Site Security**
 - A. Security fencing is highly recommended.**
 - B. Pest control, including Deer, rabbits, squirrels, gophers, insects and others.**
 - C. Bio-security methods to prevent potential orchard contamination by unwanted truffle competition.**
- 4. Conduct Soil Profile analysis to determine drainage. A simple percolation test is adequate.**
- 5. Determine site water availability. An irrigation system is highly suggested.**
- 6. Design irrigation system. Irrigation materials supply companies can provide this service.**
- 7. Test water supply capability for irrigation purposes. Well drilling companies provide this information.**
- 8. Modify soil chemistry as needed for selected truffle species.**
- 9. Identify potential nursery tree suppliers.**
- 10. Determine planting schedule and order seedlings. Plan ahead as lead times can be as long as a year.**
- 11. Complete site work and prepare for planting schedule.**



Truffle tree seedling guide for new growers.

The decision to plant a new truffle orchard is fraught with questions and decisions that are very important. New orchard enthusiasts often need guidance on topics of concern and questions to ask potential suppliers.

With this in mind, the Marketing and Education Task Force proceeded to develop this list of questions to assist new truffle growers. My committee interviewed the following truffle experts to provide feedback and offer their suggestions for this list. Thank you to Dr. Paul Thomas, Dr. Shannon Berch, Dr. Charles Lefevre, Christine Fischer, and Brian Upchurch.

The first and probably most important questions after deciding on a location for your orchard is sourcing root stock and assuring that you have vetted the tree supplier to the best of your ability. Since most new growers are novices in this area, we at NATGA are suggesting a list of questions to ask of potential tree suppliers. The nursery grower may or may not choose to answer and that is okay.

- **What quantity of trees do you recommend per acre?**
- **What types of trees do you offer?**
- **What species of truffles do you provide?**
- **How many types of truffle inoculated species do you offer from a single facility?**
- **Do you provide planting instructions with your shipments?**
- **Do you maintain historical data on Lot numbers of trees produced?**
- **Do you supply date of inoculation information and lot numbers of trees?**
- **What is your policy on replacement trees for infant mortality?**
- **Do you offer any type of guarantees on your product?**
- **Do you DNA test all the truffles used in your inoculum?**
- **Do you obtain your inoculum stock from more than one geographical area?**



- **How do you mitigate contamination at your facility?**
- **Do you test your rootstock for invasive species such as brumale and indicum?**
- **What percentage of trees per lot do you test?**
- **What is your minimum threshold of target species colonization? How is this verified?**
- **Do you provide testing information to the buyer ?**
- **Do you support third party verification of your testing?**
- **Do you ship bare root or in soil?**
- **What is your recommended age of the tree before shipping?**
- **Is your facility qualified to ship stock to all North America?**
- **What is your recommended shipping method?**
- **Do you ship FOB Destination/Freight Allowed?**

Soil Profile



Dig a hole 3 to 5 feet deep

Observe the types of soil layers

In this picture we can see a layer of loam

And a layer of clay

Percolation Test

Fill the hole with water and time how long it takes to drain

Report of Soil Analysis



Ag Unlimited - Ukiah
4550 El Roble Road
Ukiah CA 95482
17426
07

ID: Hazelnuts

1910 W. McK
FAX (559) 26



DELLAVALLE[®]
Laboratory, Inc.
Chemists and Consultants

inley, Suite 110, Fresno, CA 93728
8-8174 - (800) 228-9896 - (559) 233-6129

Lab No.	288271
Sampled Date	11/30/2018
Submitted Date	12/10/2018
Submitted by	Ag Unlimited - Ukiah 4550 El Roble Road Pete Sweeney
Reported Date	Ukiah CA 95482 12/17/2018
Location/Project	17426 Angerer
Copy To	07
Fax	
E-mail	Hazelnuts devin@pacific.net

No.	Description	%	units	dS/m	meq/l	meq/l	meq/l	meq/l	%	T/ac-6"	+/-	lbs/ac-6"	mg/l	mg/kg	mg/kg	Description	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
	SP	pH	EC	Ca	Mg	Na	Cl	ESP	GR	Lime	Lime	B	NO ₃ -N	PO ₄ -P		K	Acid K	Zn	Mn	Fe	Cu	OM		
	RL-->	0.50	1.0	0.01	0.1	0.1	0.1	0.1	0.1			500	0.1	1.0	2.0	RL-->	2.0	40.0	0.1	0.1	0.1	0.1	0.01	
	NAPT Methods-->	S1.00	S1.10	S1.20	S1.60	S1.60	S1.60	S1.40	Calc.			S2.50	S1.50	S3.10	S4.10	NAPT Methods-->	S5.10		S6.10	S6.10	S6.10	S6.10	S9.20	
	Handbook 60-->								Hndbk 60-22d	Hndbk 60-23a					Handbook 60-->			SSSA,p5 61 mod						
1	Blocks 1 & 2	31	7.6	0.61	3.1	1.9	1.2	<0.1		++		0.2	3	29	Blocks 1 & 2	223		7.4	7.7	46.7	3.3	1.97		
2	Blocks 3	37	7.7	0.64	3.4	2.0	1.0	<0.1		-		0.1	1	20	Blocks 3	162		1.2	8.1	42.7	2.8	1.92		
3	Blocks 4	39	7.7	0.59	3.1	1.9	1.2	<0.1		-		0.2	4	26	Blocks 4	182		1.4	6.9	47.2	3.3	1.80		

LAND PREPARATION

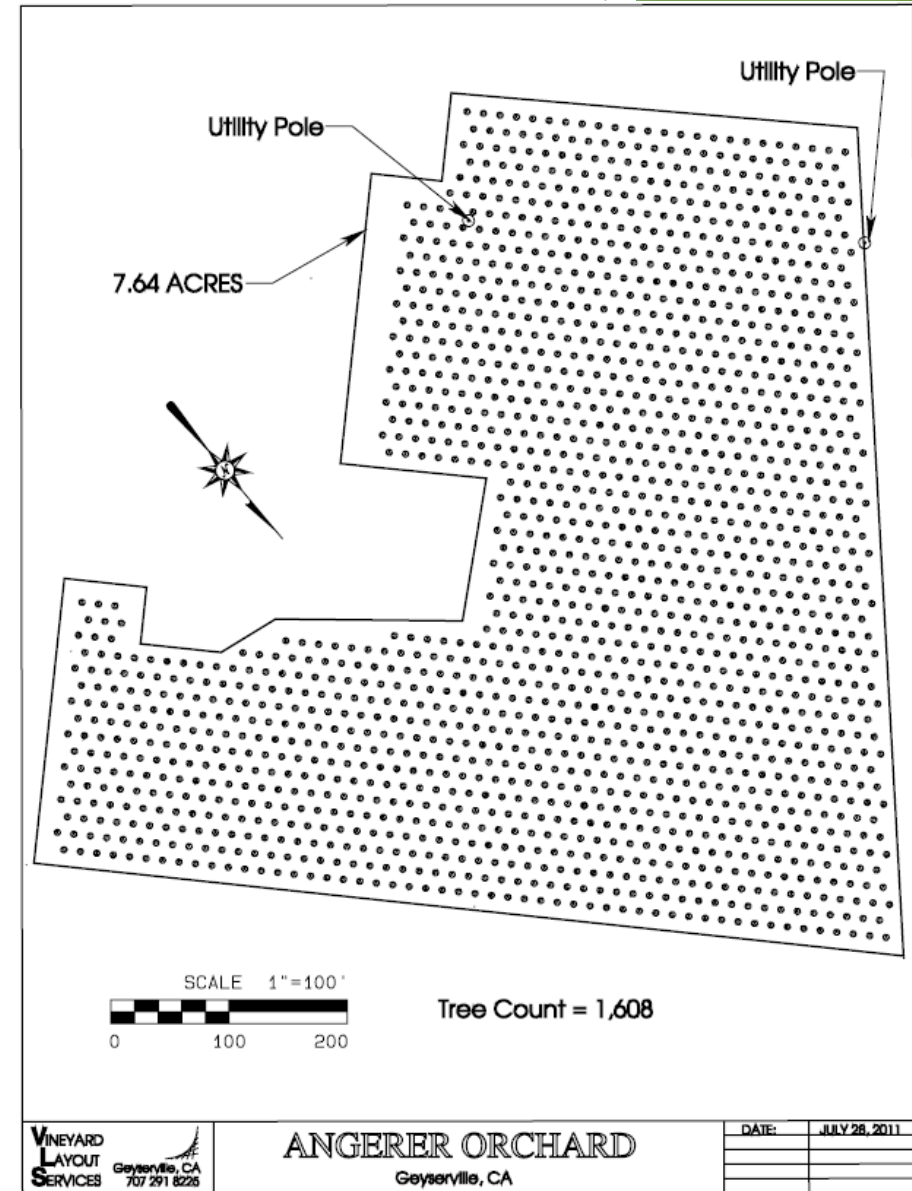


PH adjustment and deep ripping

Plan your Layout



Use Google Earth





Fencing

Orchard Fence



Irrigation



Broadcast Watering

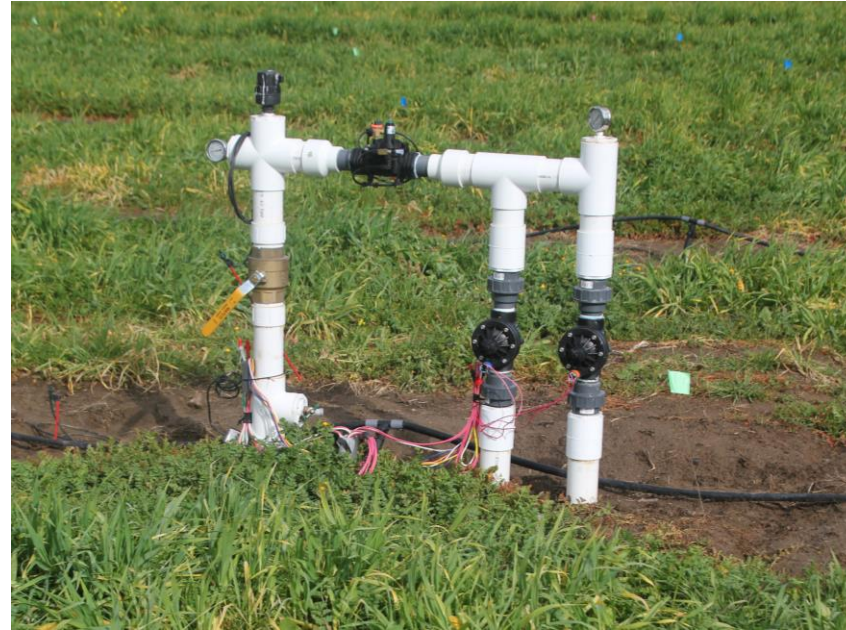


High Water Volume

High Maintenance

Frequent Mowing

Higher Pressure Required

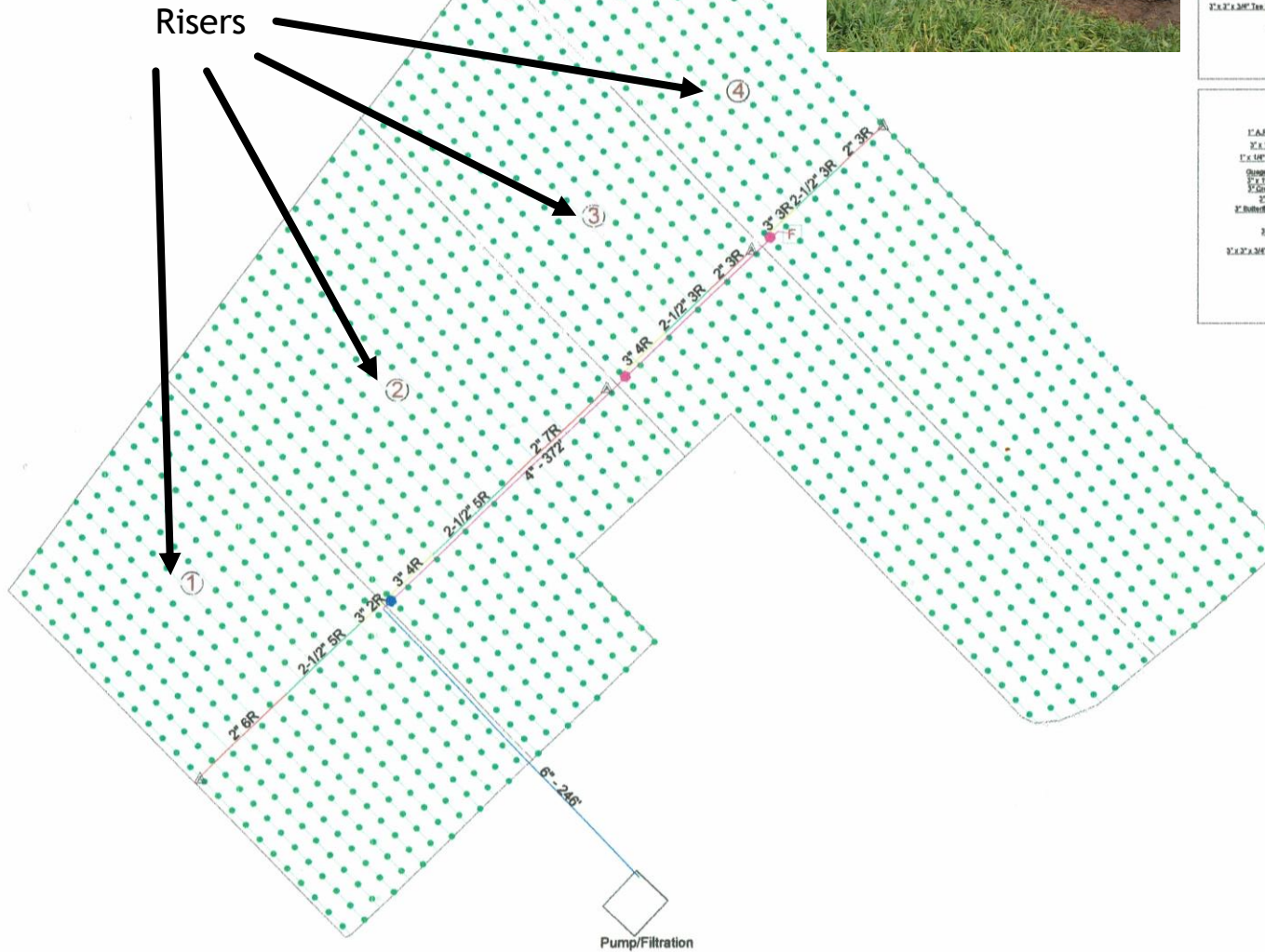
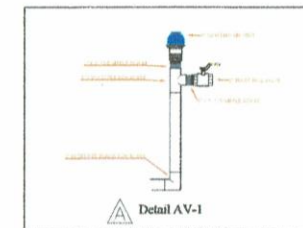
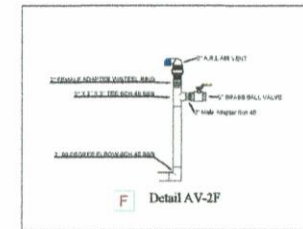
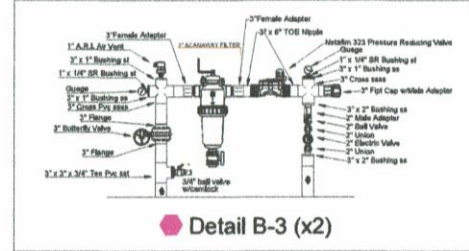
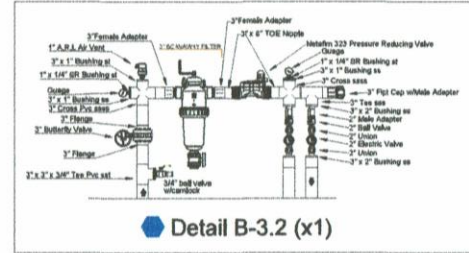


Control Riser



Drip Watering

Block	Spacing	Tree #	# of Rows	Drip Gpm	Acres
1	14' x 14'	332	21	73.7	1.50
2	14' x 14'	406	25	90.1	1.83
3	14' x 14'	403	25	89.5	1.82
4	14' x 14'	446	17	99.0	2.01
TOTALS		1587	88	352.3	7.15



WYATT
IRRIGATION SUPPLY INC.

General Notes

- 4" SCH40 SW PVC Pipe
- 2-1/2" SCH40 SW PVC Pipe
- 2" SCH40 SW PVC Pipe
- 1 1/2" SCH40 SW PVC Pipe
- 1 1/4" SCH40 SW PVC Pipe

Valve Key:

Design Based On:

1 - Nelson R5 Sprayers
per Tree

No.	Revision/Issue	Date

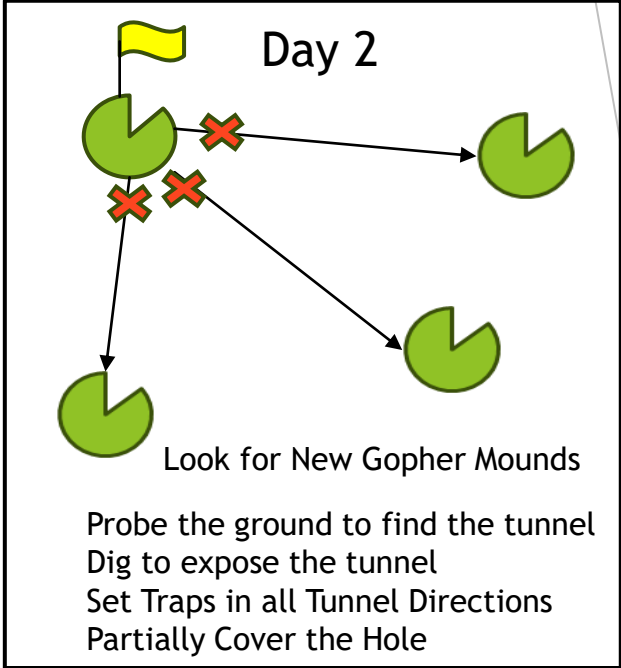
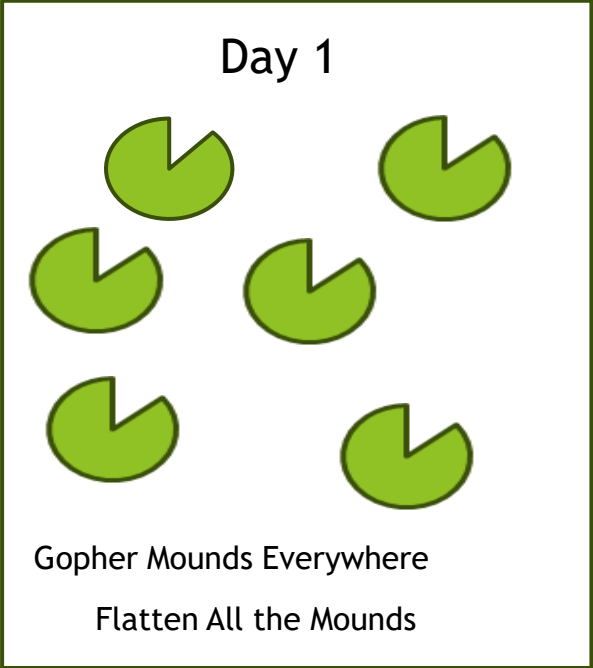
Client Name and Location

Angerer Truffle
Orchard

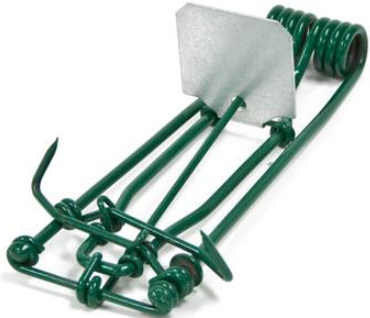
Design #	Sheet
Drip	1 of 1
Date	Designed By
	Jay Palm
Scale	Drawn By
1" = 40'	

Gopher Gettin'

- Carbon Monoxide
- Propane
- Drowning
- Trapping
- Shooting
- Birds



Day 3



- We use Macabee Traps
- We took over 1000 Gophers off 10 Acres
- We have not lost 1 tree to Gophers
- It is a continuous process

Planting



Now is the time to have your seedlings tested by a third party laboratory for verification of Truffle type, colonization rate and possible contaminants.



Grower/Location

Truffle Testing Sample Form

Name:	
Company name:	
Date collected:	
Location (city, state):	
Phone number:	
Email:	

Samples

Line	Tree no.	Truffle	Tree species	Location	Notes
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Tree no.: this is the number that identifies which tree was sampled.

Truffle: the truffle species the trees were inoculated with (black périgord, burgundy or summer, bianchetto, etc.)

Tree species: indicate the tree species

Location: This is to identify tree location

Notes: Additional information noted with truffle sample

Equipment

Equipment needs will vary depending on orchard size



You will need a tractor



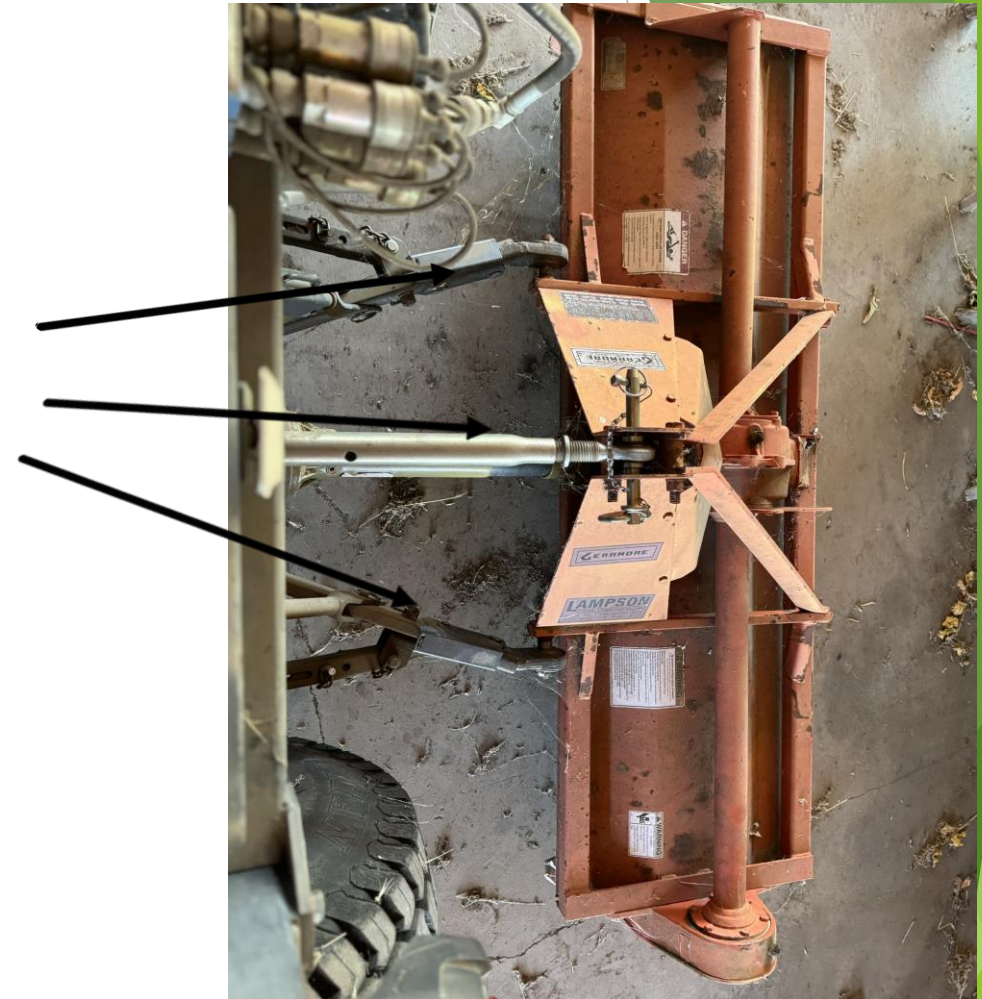
You will need a mower

Just a word on the business end of a tractor.

The PTO



3 Point



The PTO (power take off) is a hydraulically driven rotating shaft on the back end of the tractor that operates various 3 point tools. This is where serious injuries happen. If you are unfamiliar with farm equipment do not mess around here until you receive training.



Soil Spader

Cultivates without breaking down soil structure.

Runs from PTO

Cost about \$15,000



In Row Cultivator





Brand New Tree



3 Year Old Tree



Plant Leaf Testing Analysis



**AgSource
Laboratories**

A Subsidiary of Cooperative Resources International

300 Speedway Circle, Suite 2
Lincoln, NE 68501

Tel: 402-476-0300
Fax: 402-476-0301

**PLANT
ANALYSIS**



Submitted By:

Ag Unlimited
20780 Geyserville Ave
PO Box 378
Geyserville, CA 954410378

Submitted For:

ANGERER PS

Plant Information Sheet No.

216063

Laboratory Sample No.

AK65786

Date Reported: **30-Apr-14**

Sample Marked: **ORCH 3-4**

Laboratory Turnaround: **2 Days**

Crop: **FILBERTS**

Samples Will Be Stored Until: **13-May-14**

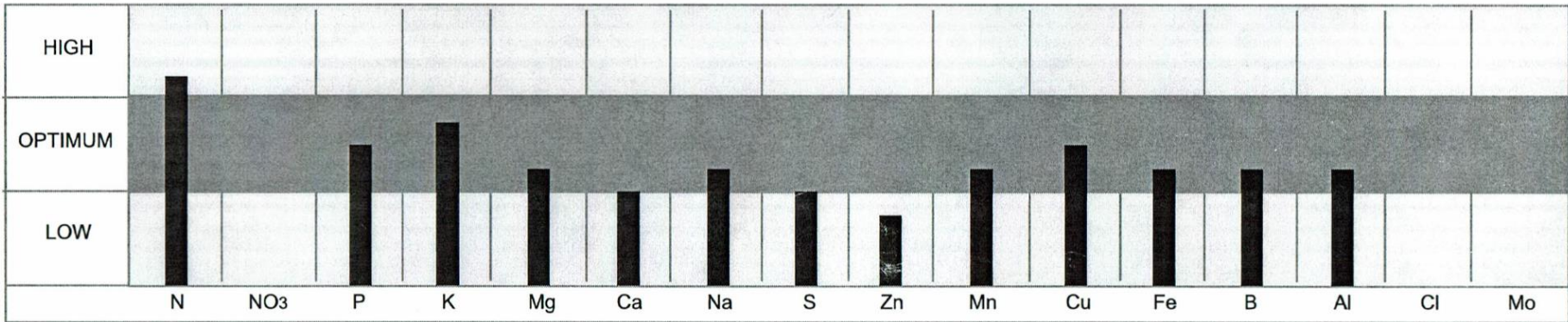
Plant Part: **LEAF**

Results of Laboratory Analysis

Laboratory Analysis	3.06		0.21	0.94	0.38	0.86	0.02	0.20	16.11	28.1	8.9	97.2	54.2	29.9	0.3	
	% Nitrogen	ppm Nitrate	% Phosphorus	% Potassium	% Magnesium	% Calcium	% Sodium	% Sulfur	ppm Zinc	ppm Manganese	ppm Copper	ppm Iron	ppm Boron	ppm Aluminum	% Chloride	ppm Molybdenum

Graphic Rating of Results Compared to Normal Ranges

Normal Ranges	2.19 to 2.5		0.15 to 0.35	0.8 to 1	0.29 to 0.69	0.99 to 2.5	0 to 0.1	0.21 to 0.29	22 to 100	25 to 300	4.9 to 15.9	47 to 250	35 to 200	0 to 200	N/A to N/A	
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Re-Inoculation Methods

Spanish Wells/Truffle Traps



Very slow and labor intensive. \$\$\$\$\$

The “Spore-nicator”



An original idea.
Much less labor and much faster than traps.

Re-Inoculation Methods

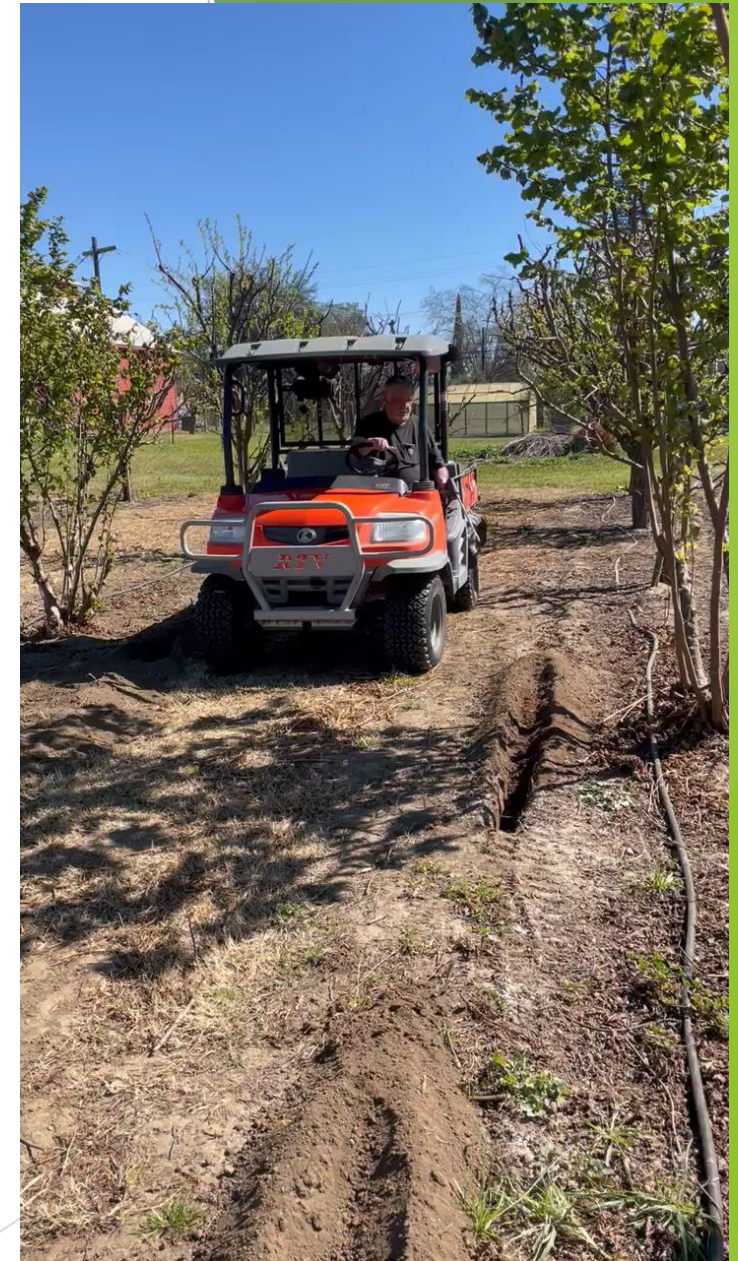
Trench and Backfill

This method is a three step process.

Step 1 Trench alongside trees

Step 2 Backfill trench with growing medium.

Step 3 Add spores and cover.



Re-Inoculation Methods

The latest method.

Clos Racine

In-Row Inoculator and Lime spreader





Bio Security entails taking pro-active measures to protect the orchard from contamination. These contaminants could be spread from one site to another on footwear, clothing or dogs. The concern is the spreading of unwanted spores or diseases that could compete with or infect the orchard.



