Vineyard Site Selection

Advanced Beginner Grape School

6 March 2020

Dean S. Volenberg

Grape and Wine Institute
University of Missouri

Site Selection – More than growing grapes

Long Term Goals

- Do you want to open a winery?
- Do you want to open a distillery?
- Do you enjoy working with the public?

Short Term Goals

- Do you want to grow grapes?
- Do you have a market for the grapes?
- Do you have a winery or other vineyards nearby?
- Are wine trails established nearby?

Grape and Wine Institute
University of Missouri

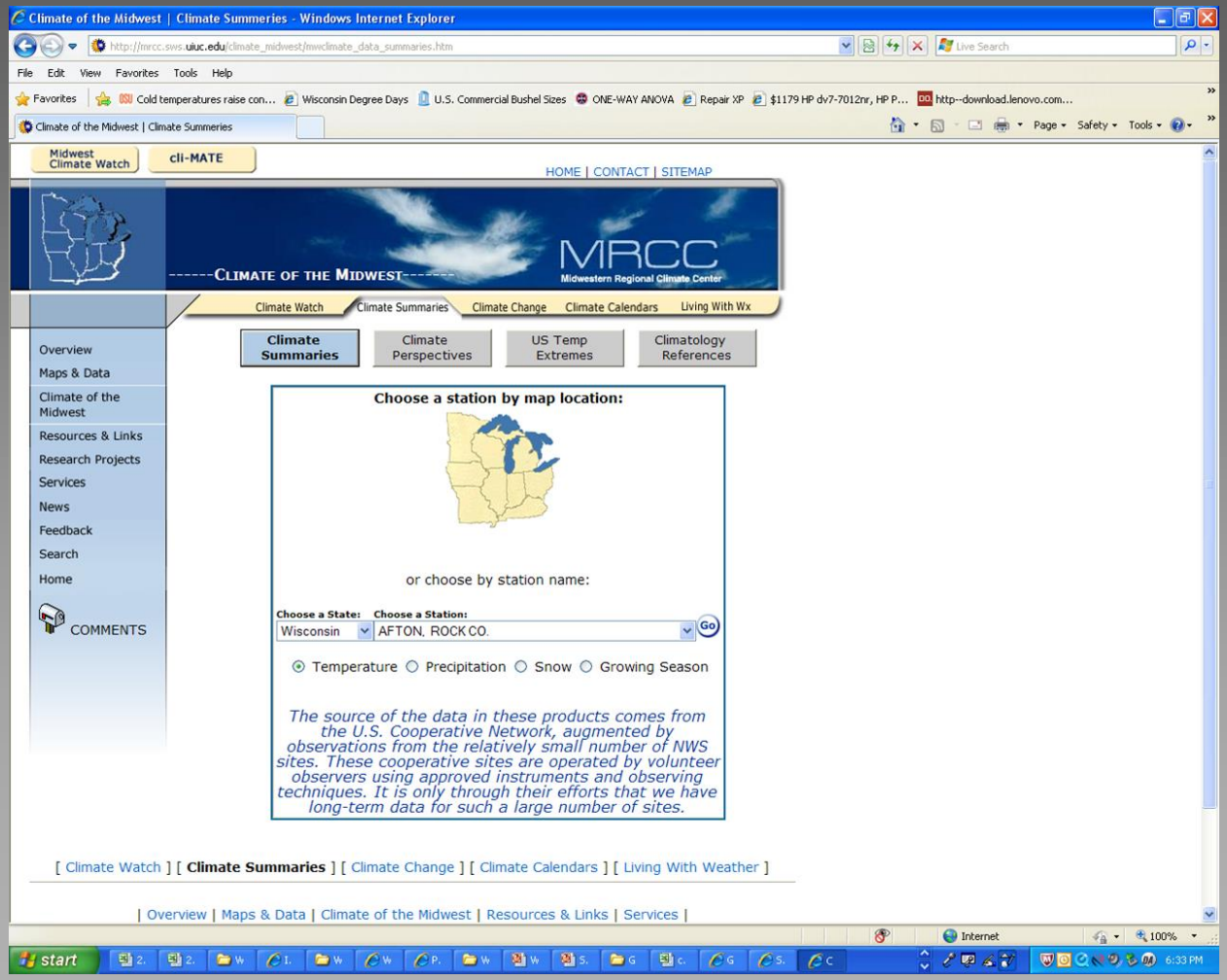
Image credit:
http://search.myway.com/search/AJimage.jhtml?&n=782aaa9b&p2=%5EXN%5Exdm372%5ES16591%5Eus&pg=AJimage&pn=1&ptb=D0F0EEB9-5C2C-45BC-9DFE-E3B6D4D369ED&qs=&searchfor=manure+pit+in+missouri&si=245051_Weather-US-B&ss=sub&st=tab&tpr=sbt&trs=wtt&imgs=1p&filter=on&imgDetail=true

Site Selection

- Macroclimate – region
- Mesoclimate – vineyard site
- Microclimate – area around vine

- Macroclimate
  - Winter temperatures
    - ≤ -20º F (-40º F Warsaw)
  - Growing season length
    - Minimum 150 frost free days
  - Growing season heat accumulation
    - Minimum 2,000 GDD (base 50)

Site Selection



- Frost Free Days
- GDD

http://mrcc.sws.uiuc.edu/climate_midwest/mwclimate_data_summaries.htm

There are a number of ways to calculate degree days, but the simplest method is called averaging

- Degree Days (DD) = average daily temperature - base temperature which =

  Maximum daily temperature + Minimum daily temperature)/2 - base temperature

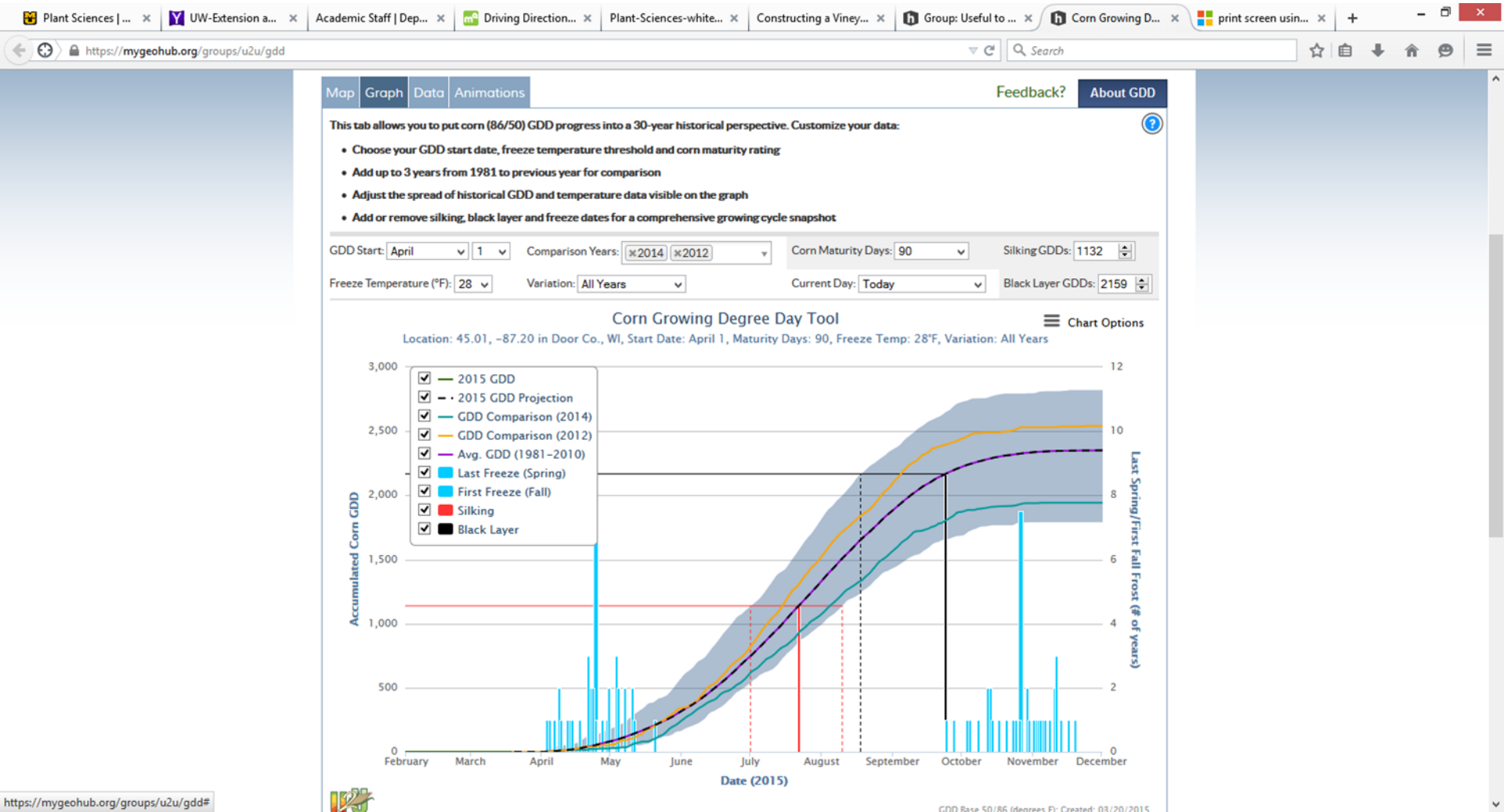
- Example: Calculate DD base 50, given 70 degrees maximum temperature and 35 degrees minimum temperature

- DD (base 50) = (70 + 35)/2 – 50 = 2.5

- If answer is negative assume 0 DD

Climate Decision Dashboard

https://mygeohub.org/groups/u2u/tools



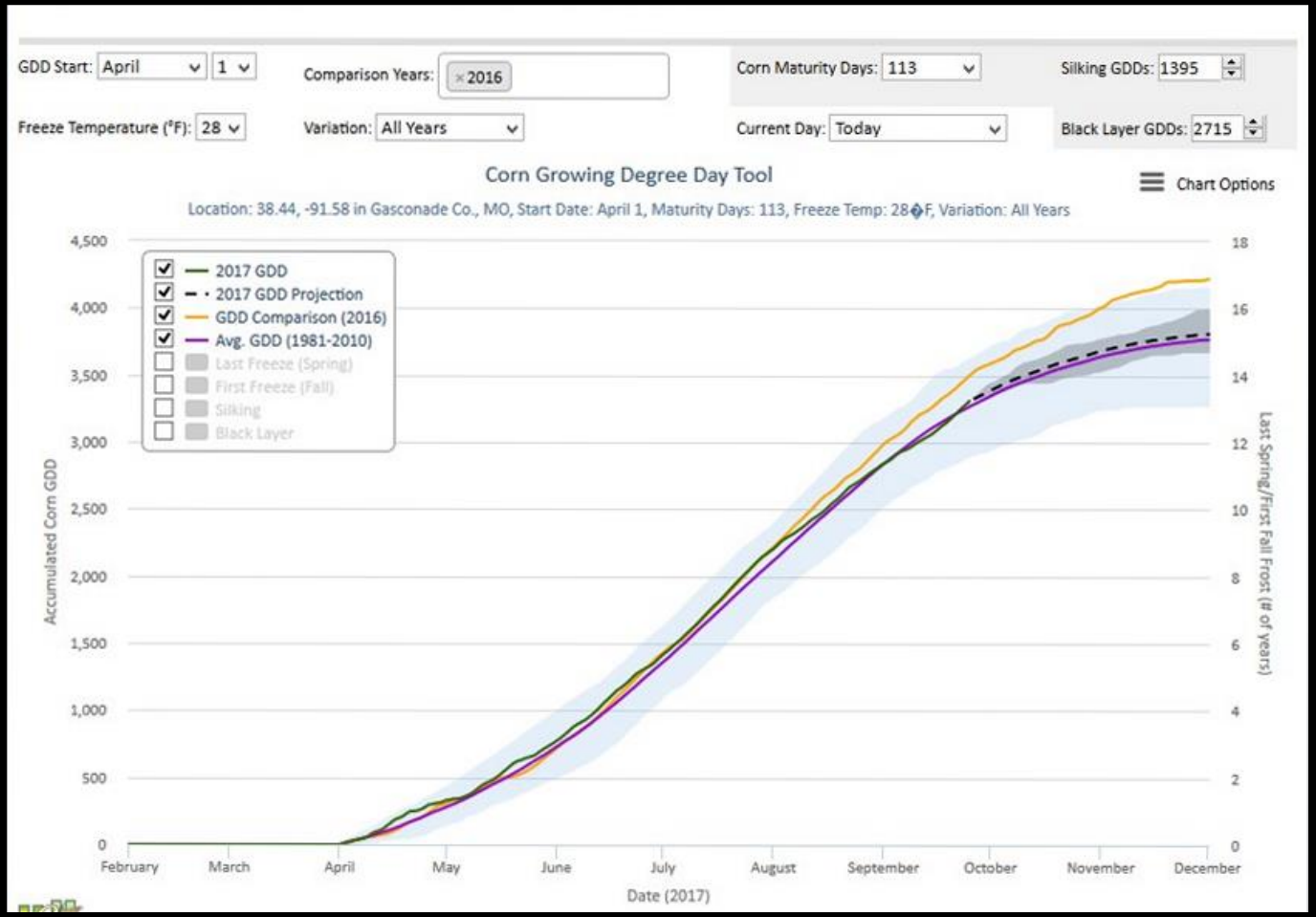
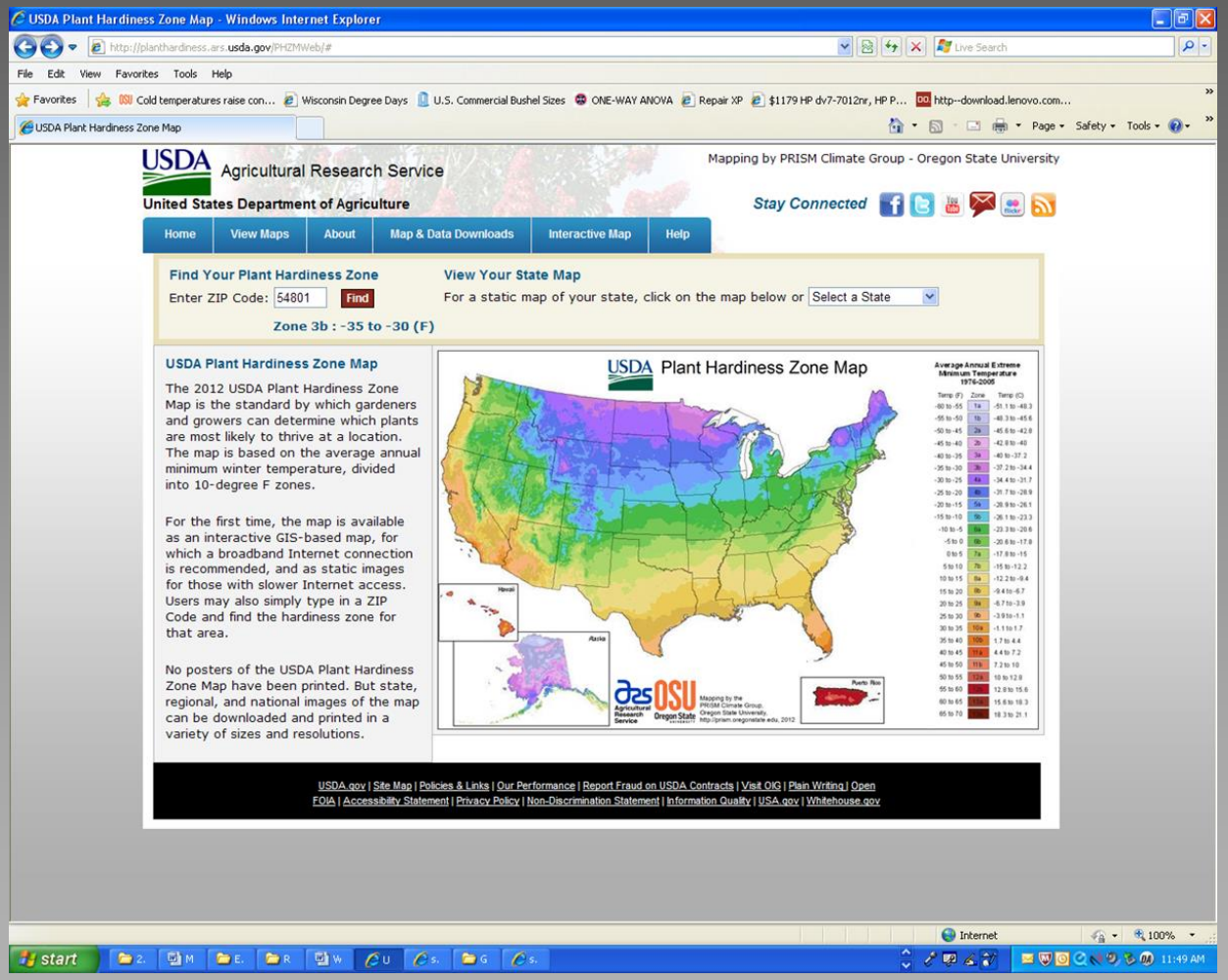


Image credit
https://hprcc.unl.edu/gdd.php

Site Selection



http://planthardiness.ars.usda.gov/PHZMWeb/#

Macroclimate

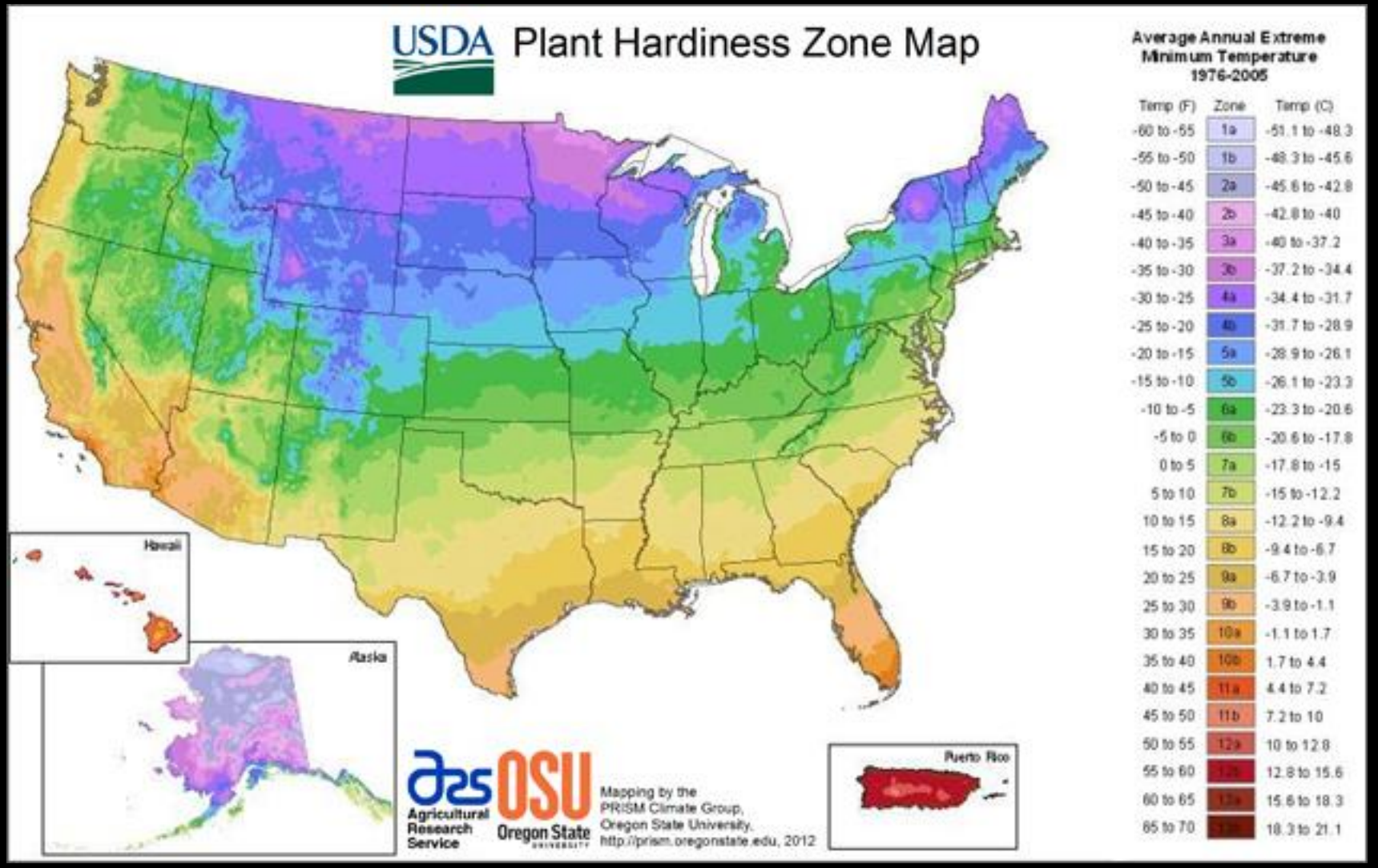
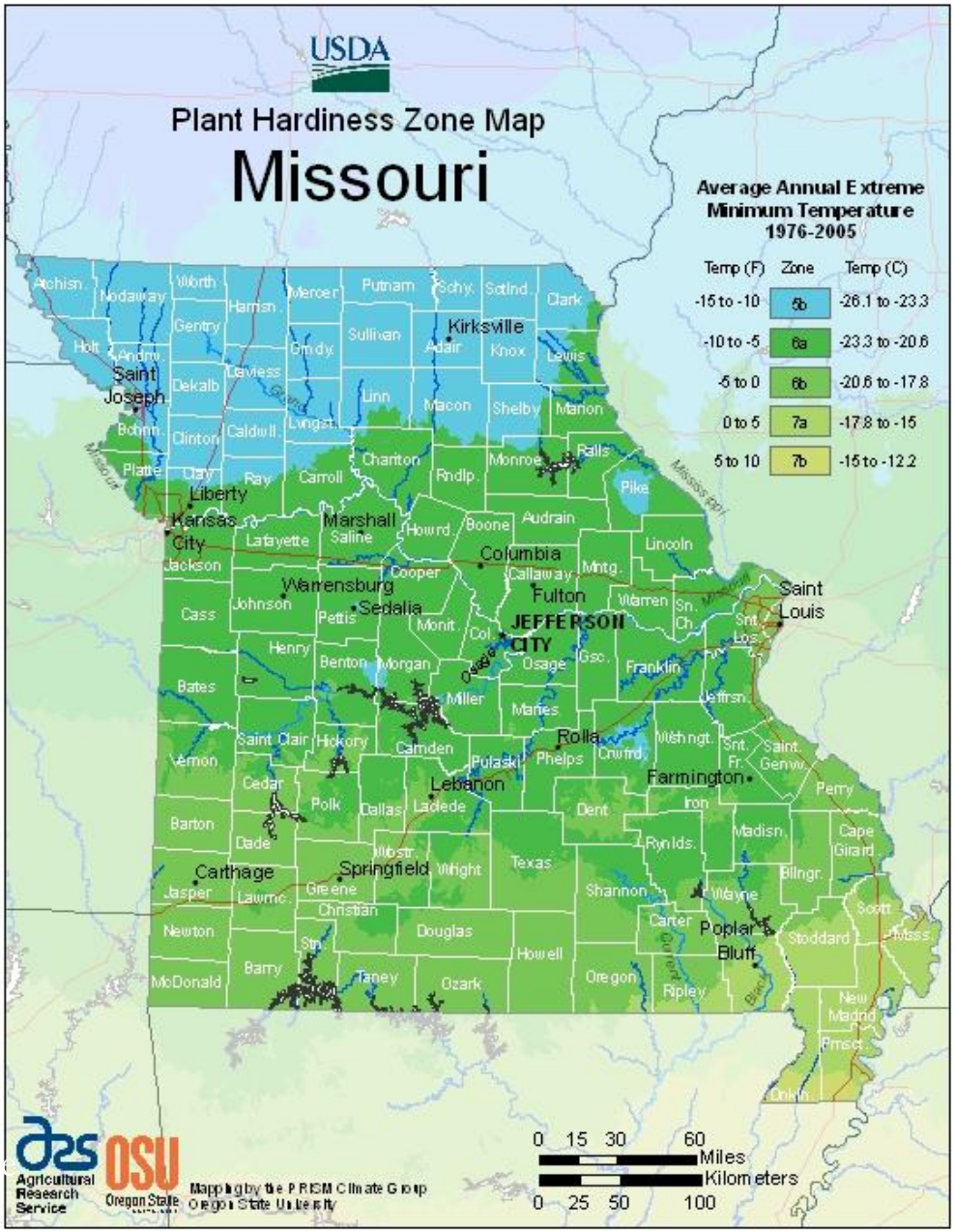


Image credit:
http://planthardiness.ars.usda.gov/PHZMWeb/

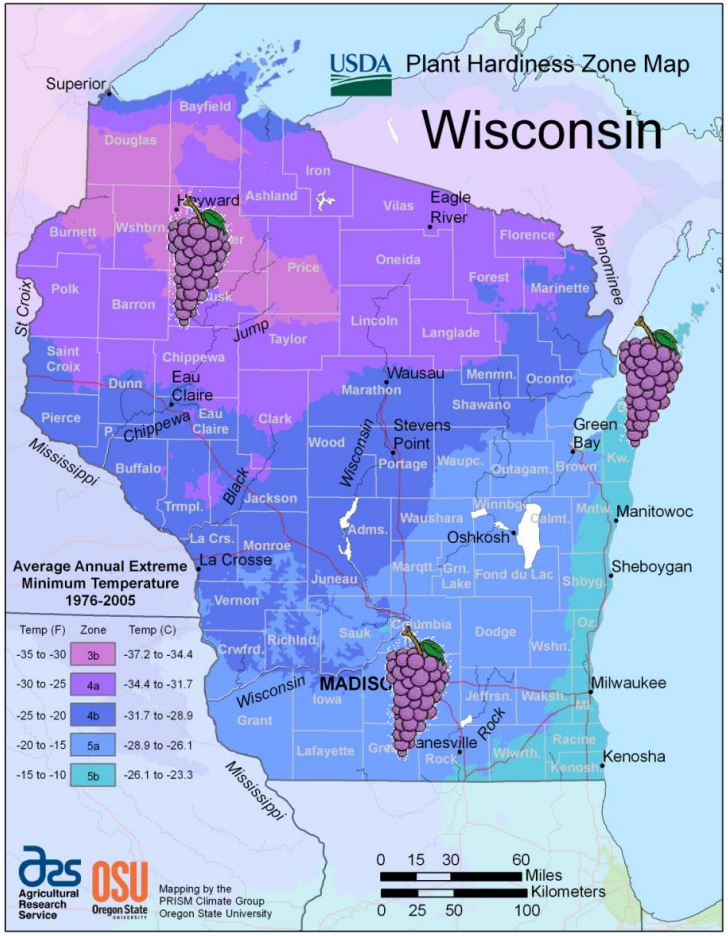
Macroclimate



Importance of Site Selection

Image credit: http://planthardiness.ars.usda.gov/PHZMWeb/#

Macroclimate



Trial Location	Hardiness Zone	Extreme Minimum Temperature
		°F
PARS	5b	-15 to -10
WMARS	5a	-20 to -15
SARS	3b	-30 to -35

Macroclimate

Number of days in selected temperature ranges at West Madison, Spooner, and Peninsular Agricultural Research Station for the period 12/1/2010 to 2/28/2011 (3rd winter after establishment)

Temperature range (°F)	West Madison[1]	Spooner[1]	Peninsular[1]
	Days		
0 to - 9	8	24	10
- 10 to - 19	4	7	0
- 20 to -29	0	6	0
> -29	0	2	0

[1]Minimum low temperatures were - 15, - 31, and -9 °F for West Madison, Spooner, and Peninsular Agricultural Research Stations, respectively.

SoilWeb: An Online Soil Survey Browser | California Soil Resource Lab - Windows Internet Explorer

http://casoilresource.lawr.ucdavis.edu/drupal/node/902

File Edit View Favorites Tools Help

Favorites | Cold temperatures raise con... | Wisconsin Degree Days | U.S. Commercial Bushel Sizes | ONE-WAY ANOVA | Repair XP | $1179 HP dv7-7012nr, HP P... | http--download.lenovo.com...

SoilWeb: An Online Soil Survey Browser | California So...

Page Safety Tools

California Soil Resource Lab

Home Links Online Soil Survey People Projects Software Site Map

SoilWeb: An Online Soil Survey Browser

- Accessing Soil Survey Data via Web-Services
- Dynamic Export of Soil Survey Data to KML through Soil-Web
- Initial SoilWeb Concept on Paper
- Major updates to CA, AZ, NV online soil survey system
- Migrating to Ka-Map! Online Soil Survey for AZ, CA and NV
- Planned Improvements in SoilWeb
- Saving Chunks of SSURGO Data in SoilWeb for Google Earth
- Soil Properties Visualized on a 1km Grid
- SoilWeb for the iPhone
- SoilWeb Usage Statistics
- Streaming Soil Survey Data in Google Earth (updates)
- Three New Soils-

SoilWeb: An Online Soil Survey Browser

Submitted by dylan on Fri, 2010-02-26 16:13.

SSURGO Map Units

STATSGO Map Units

Our online soil survey can be used to access USDA-NCSS 1:24,000 scale detailed soil survey data (SSURGO) in many parts of the lower 48 states. Where this data is not yet available, 1:250,000 scale generalized soils data (STATSGO) can be accessed instead. An interactive map interface allows for panning and zooming, with highways, streets, and aerial photos to assist navigation (Figure 1). Soil polygons become visible near a scale of 1:30,000. Alternatively, a GPS point, CA Zip code, or a street address can be used to zoom in on a specific location. General usage notes and information on how our online soil survey work can be found here. Statistics on who is using our online soil survey can be found here. Technical details on SoilWeb can be found in this publication. Please note that we are currently transitioning to a new server, and planning to have our local copy of the SSURGO, STATSGO, and OSD databases updated in the coming months.

The SoilWeb app is a portable version of the UC Davis California Soil Resource Lab's Web-based interface to digital soil survey data from USDA's Natural Resources Conservation Service (NRCS).

Select an Interface to SoilWeb

- An iPhone App for real-time, location-based soil queries! [details] [SSSA News Brief] [ANR News Article] [UCD Aggie Article]
- Similar App for AndroidOS smartphones
- Google Maps interface
- Google Earth Interface
- A Text-only interface to SSURGO

- HTTP SoilWeb API:
  1. WMS queries (access our data in QGIS etc.)
     - WMS GetCapabilities request
  2. Text-based queries

REAL TIME SOIL DESCRIPTIONS BASED ON YOUR CURRENT LOCATION

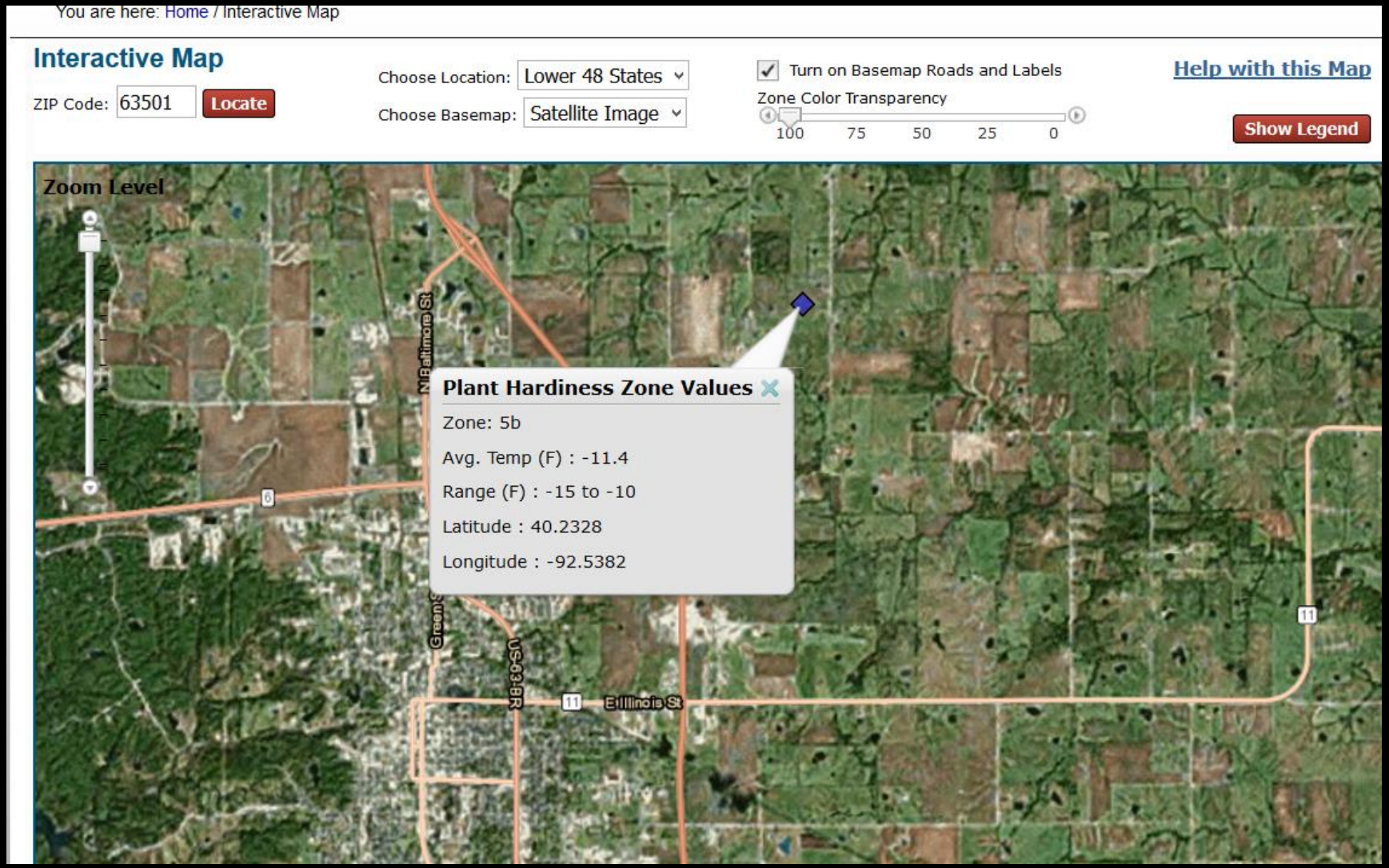
start

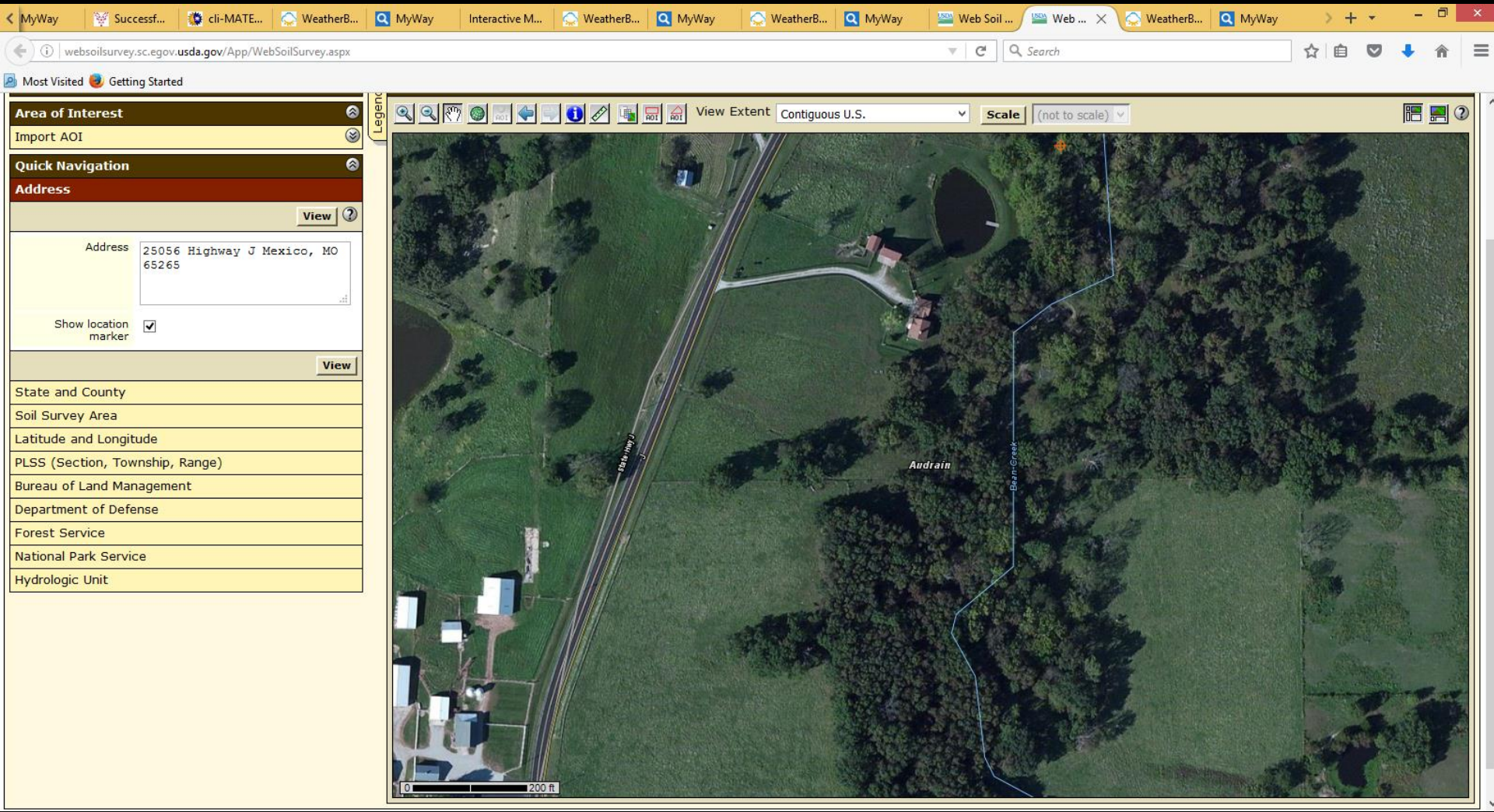
1:38 PM

Soil Resources

http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Mesoclimate

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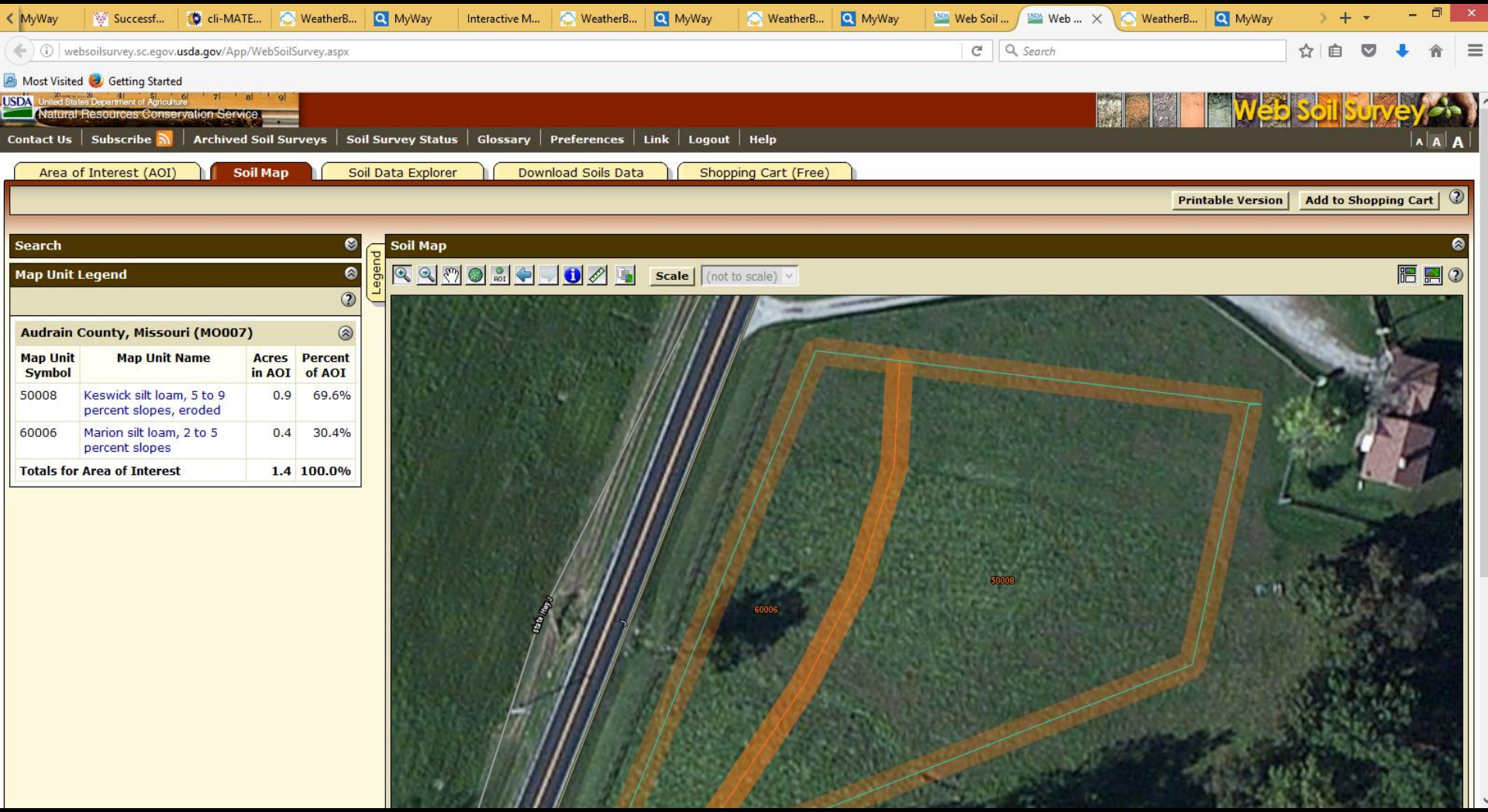
websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx
Search
Most Visited
Getting Started
Area of Interest
Import AOI
Quick Navigation
Address
View
Address
25056 Highway J Mexico, MO 65265
Show location marker
View
State and County
Soil Survey Area
Latitude and Longitude
PLSS (Section, Township, Range)
Bureau of Land Management
Department of Defense
Forest Service
National Park Service
Hydrologic Unit
Legend
View Extent
Contiguous U.S.
Scale
(not to scale)
Audrain
Bear Creek
0
200 ft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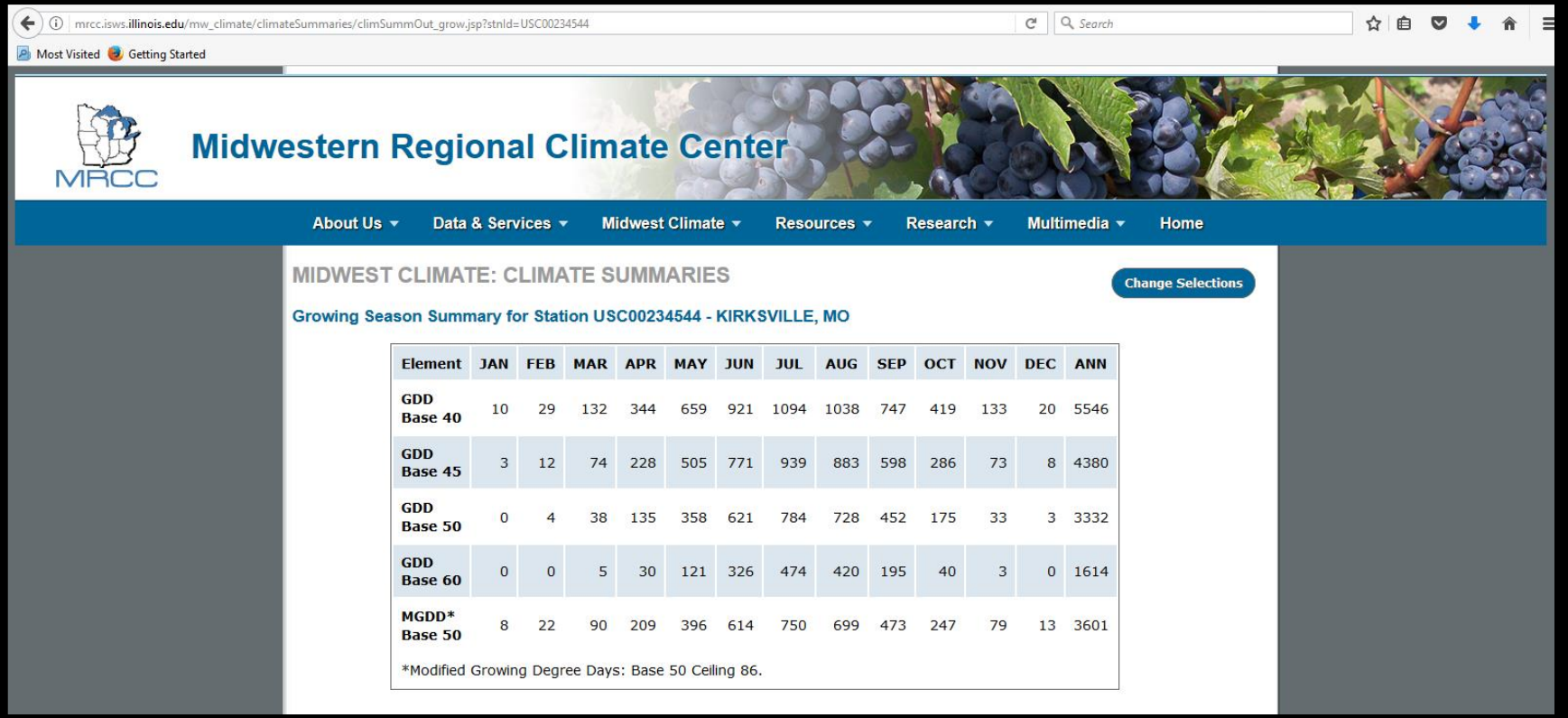
websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx
Search
Most Visited
Getting Started
USDA United States Department of Agriculture
Natural Resources Conservation Service
Web Soil Survey
Contact Us | Subscribe | Archived Soil Surveys | Soil Survey Status | Glossary | Preferences | Link | Logout | Help
Area of Interest (AOI)
Soil Map
Soil Data Explorer
Download Soils Data
Shopping Cart (Free)
Printable Version
Add to Shopping Cart
Search
Map Unit Legend
Audrain County, Missouri (MO007)
Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI
50008 | Keswick silt loam, 5 to 9 percent slopes, eroded | 0.9 | 69.6%
60006 | Marion silt loam, 2 to 5 percent slopes | 0.4 | 30.4%
Totals for Area of Interest | 1.4 | 100.0%
Legend
Soil Map
Scale
(not to scale)
50008
60006

Mesoclimate



Element	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
GDD Base 40	10	29	132	344	659	921	1094	1038	747	419	133	20	5546
GDD Base 45	3	12	74	228	505	771	939	883	598	286	73	8	4380
GDD Base 50	0	4	38	135	358	621	784	728	452	175	33	3	3332
GDD Base 60	0	0	5	30	121	326	474	420	195	40	3	0	1614
MGDD* Base 50	8	22	90	209	396	614	750	699	473	247	79	13	3601

*Modified Growing Degree Days: Base 50 Ceiling 86.

Image credit:http://mrcc.isws.illinois.edu/

Mesoclimate

Growing Season Summary - Derived from 1981-2010 Averages

	DATE OF LAST SPRING OCCURRENCE					DATE OF FIRST FALL OCCURANCE				
Base Temp °F	Median	Early	90%	10%	Late	Median	Early	90%	10%	Late
36	05/02	02/28	05/16	04/19	05/31	10/01	09/07	09/18	10/15	03/15
32	04/24	02/28	05/05	04/09	05/25	10/11	09/13	09/25	10/26	03/15
28	04/13	02/28	04/29	03/31	05/04	10/23	09/26	10/06	11/06	03/15
24	04/04	02/27	04/20	03/19	05/04	11/02	10/06	10/19	11/17	03/18
20	03/26	12/26	04/11	03/08	04/24	11/12	10/09	10/30	11/29	03/01
16	03/15	12/26	04/02	02/27	04/12	11/23	10/23	11/05	12/10	07/03

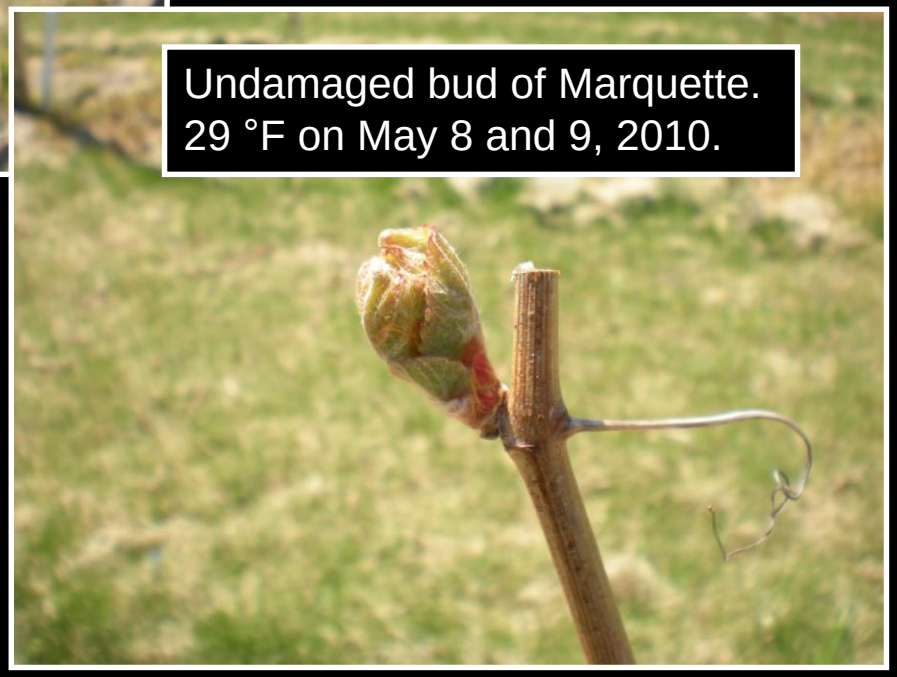
Mesoclimate

Length of Growing Season (Days) - Derived from 1981-2010 Averages
*Annual/seasonal totals may differ from the sum of the monthly totals due to rounding

Base Temp °F	Median	Shortest	10%	90%	Longest
36	149	112	129	169	214
32	169	128	149	190	221
28	190	157	169	211	247
24	211	161	189	232	262
20	230	196	209	254	288
16	149	161	227	275	262

Mesoclimate

Frost damaged bud of Marquette.
29 °F on May 8 and 9, 2010.



Undamaged bud of Marquette.
29 °F on May 8 and 9, 2010.

Mesoclimate

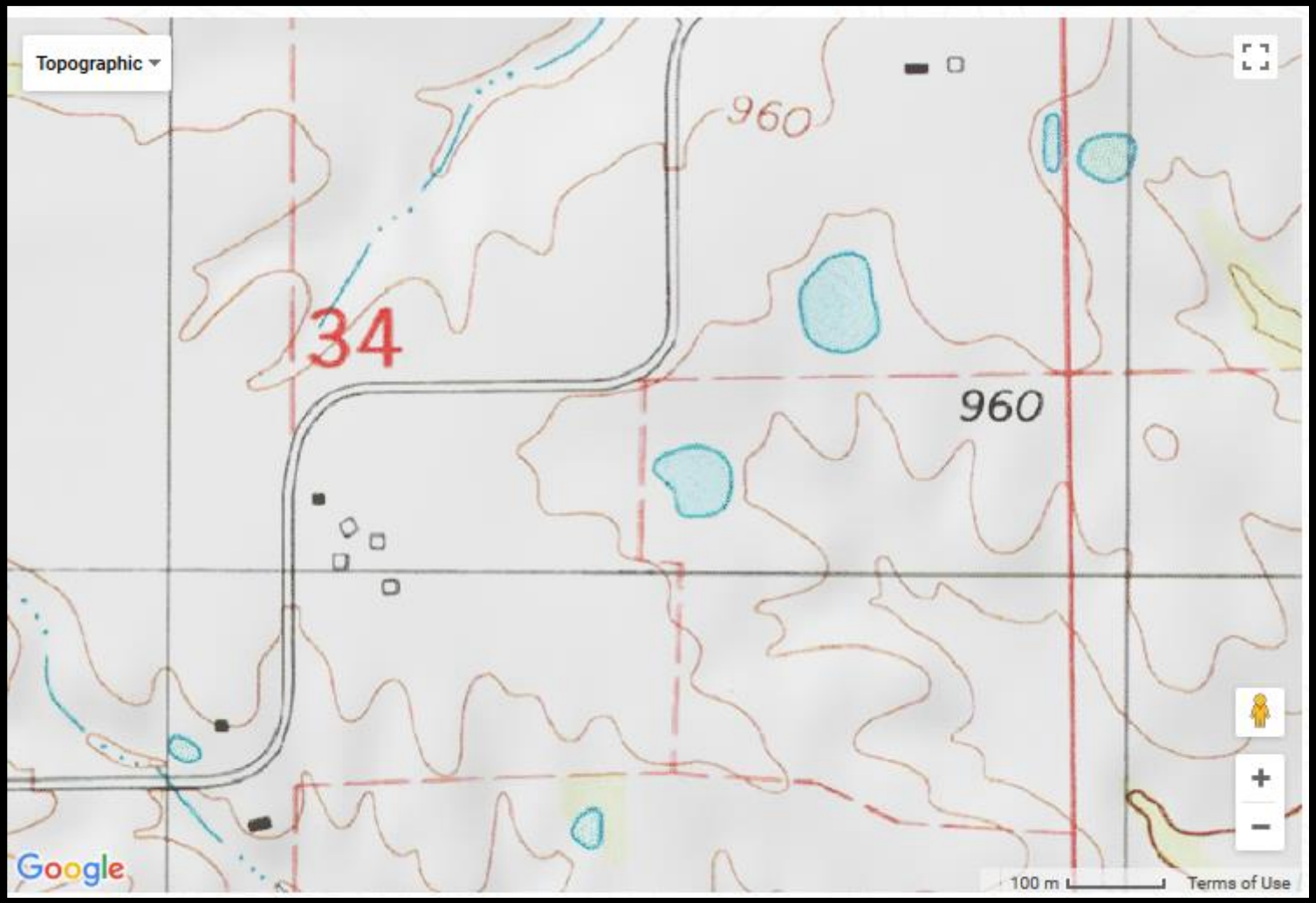


Image credit: https://www.topozone.com/missouri/adair-mo/

Mesoclimate - Soil

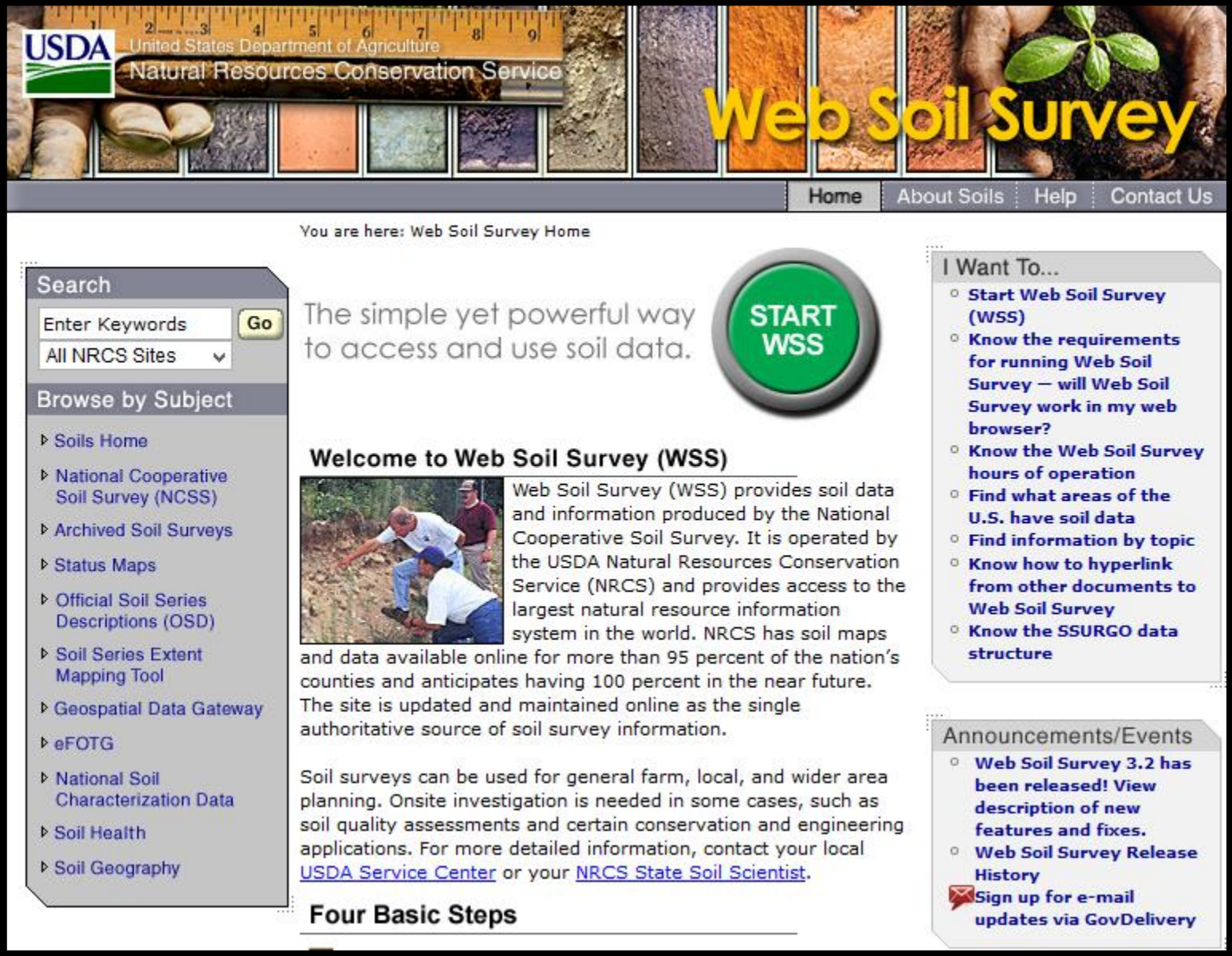


Image credit: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Mesoclimate - Soil

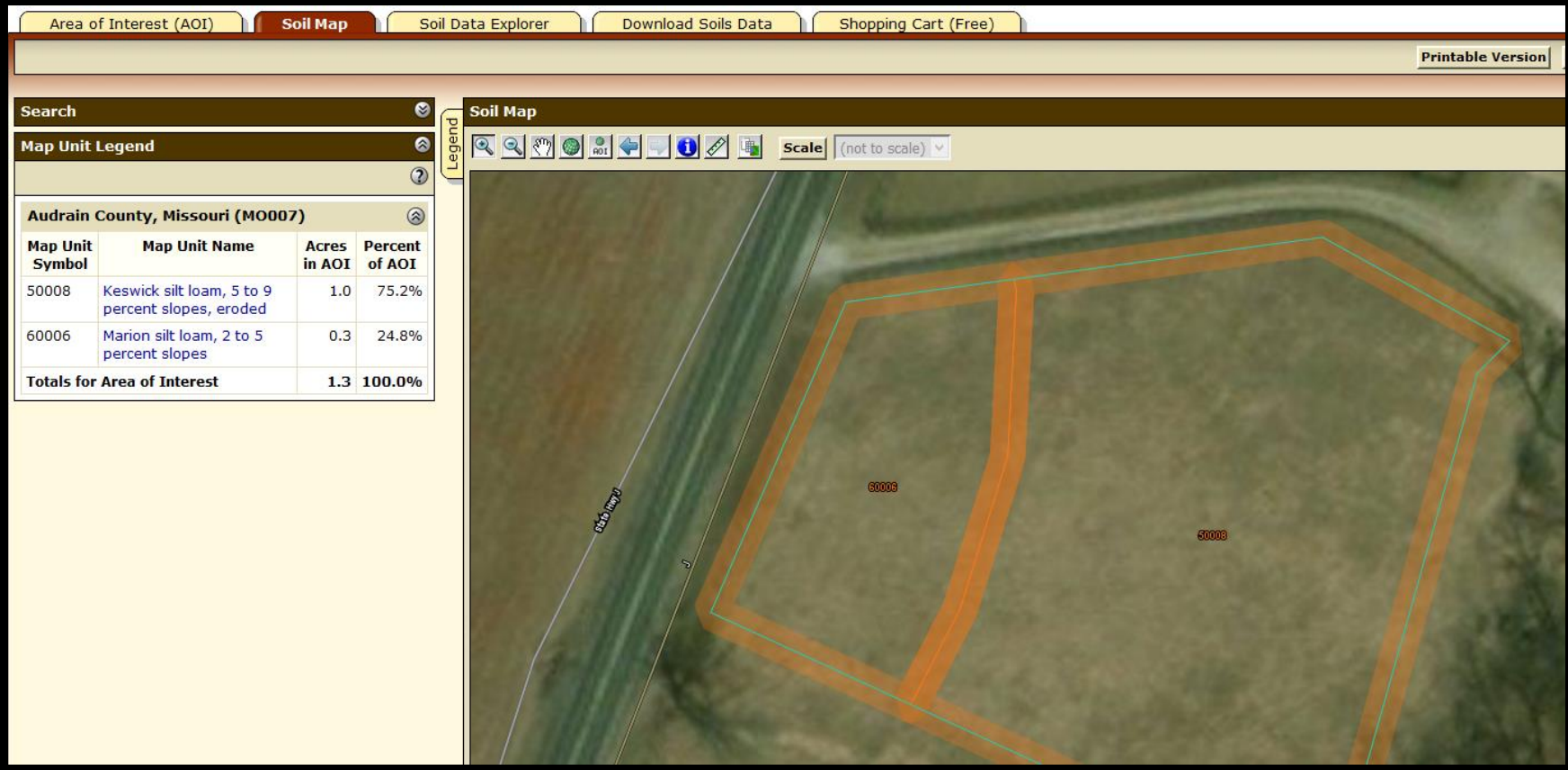


Image credit: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Mesoclimate - Soil

Tables — Grape non-irrigated (MO) — Summary By Map Unit

Summary by Map Unit — Audrain County, Missouri (MO007)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
50008	Keswick silt loam, 5 to 9 percent slopes, eroded	unsuited	Keswick (75%)	unsuited - Texture (0.00)	1.0	75.2%
				unsuited - pH (0.24)		
				poorly suited - Wet Layer (0.35)		
				poorly suited - AWC (0.45)		
				moderately suited - OM (0.60)		
			Leonard (5%)	unsuited - Texture (0.00)		
				unsuited - Wet Layer (0.10)		
				unsuited - pH (0.24)		
				poorly suited - AWC (0.49)		
				moderately suited - OM (0.68)		
60006	Marion silt loam, 2 to 5 percent slopes	unsuited	Marion (90%)	unsuited - Texture (0.00)	0.3	24.8%
				unsuited - Wet Layer (0.23)		
				unsuited - pH (0.24)		
				moderately suited - AWC (0.50)		
				moderately suited - OM (0.63)		
			Mariosa (5%)	unsuited - Texture (0.00)		
				unsuited - Wet Layer (0.07)		
				unsuited - pH (0.24)		
				poorly suited - OM (0.35)		
				moderately suited - AWC (0.61)		
Totals for Area of Interest					**1.3**	**100.0%**

Table — Grape non-irrigated (MO) — Summary by Rating Value

Summary by Rating Value

Image credit: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Mesoclimate - Soil

UCDAVIS
CALIFORNIA SOIL RESOURCE LAB

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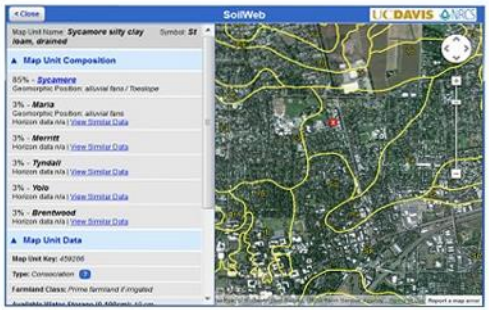
HOME » SOILWEB APPS

SoilWeb Apps

SoilWeb products can be used to access USDA-NCSS detailed soil survey data (SSURGO) for most of the United States. Please choose an interface to SoilWeb:

SoilWeb

Explore soil survey areas using an interactive Google map. View detailed information about map units and their components. This app runs in your web browser and is compatible with desktop computers, tablets, and smartphones.



SoilWeb Earth

Soil survey data are delivered dynamically in a KML file, allowing you to view mapped areas in a 3-D display. You must have Google Earth or some other means of viewing KML files installed on your desktop computer, tablet, or smartphone.

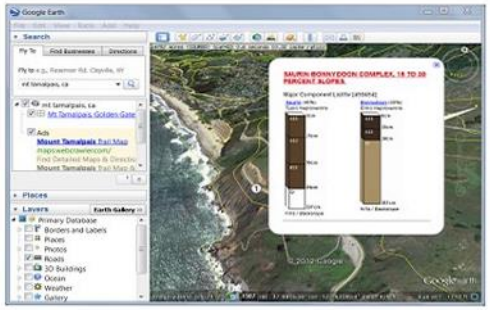


Image credit: https://casoilresource.lawr.ucdavis.edu/soilweb-apps/

Mesoclimate - Soil

A 3 ft deep hole full of water should drain:

- 24-48 hrs – Good
- 48-72 hrs – Marginal
- 72+ hrs – Poor site

1. Hole 12” diameter either 12” or 36” deep
2. Fill hole with water and let drain
3. Refill and measure water level over time
4. 1 to 3” drainage per hour

https://www.todayshomeowner.com/diy-soil-drainage-perk-test-for-your-yard/

Mesoclimate - Soil

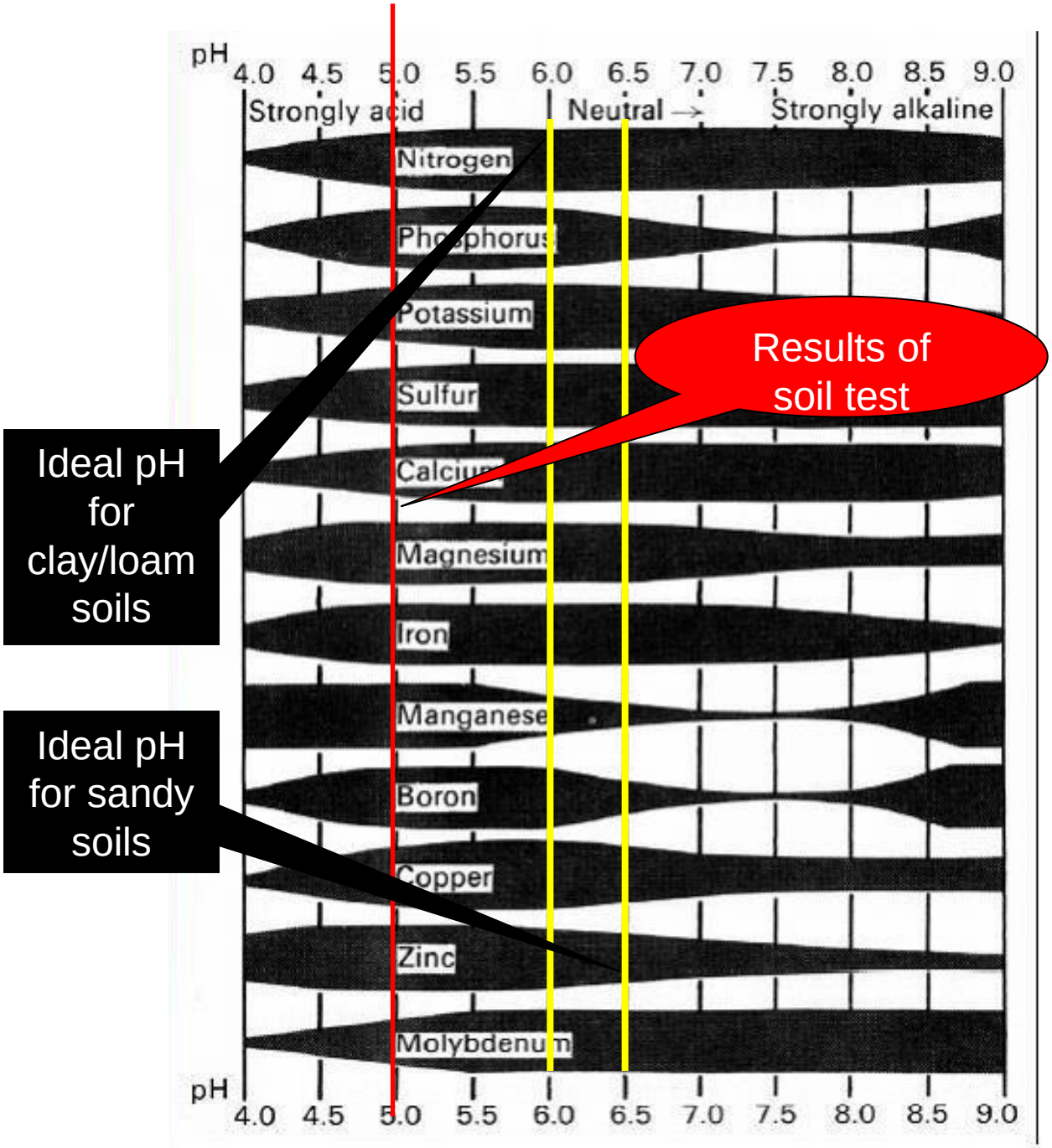
SOIL TEST INFORMATION			RATING	SOIL TEST INFORMATION			RATING
pH_s	(salt pH)	5.0	Low	Sulfur	(SO_4-S)	9.8 ppm	Medium
Phosphorus	(P)	65 lbs/a	Medium	Zinc	(Zn)	0.9 ppm	Medium
Potassium	(K)	486 lbs/a	Very High	Manganese	(Mn)	10.8 ppm	High
Calcium	(Ca)	4418 lbs/a	Medium	Iron	(Fe)	93.7 ppm	High
Magnesium	(Mg)	516 lbs/a	High	Copper	(Cu)	0.83 ppm	High
Sodium	(Na)			Boron	(B)	1.04 ppm	High

Organic matter	3.3 %	Neutralizable acidity	5.5 meq/100g	Cation exchange capacity	19.3 meq/100g
pH in water		Electrical conductivity	mmho/cm	Soil texture	Clay loam, Clay
Nitrate (NO_3-N) Topsoil	ppm	Subsoil	ppm	Sampling depth Top	inches Subsoil inches

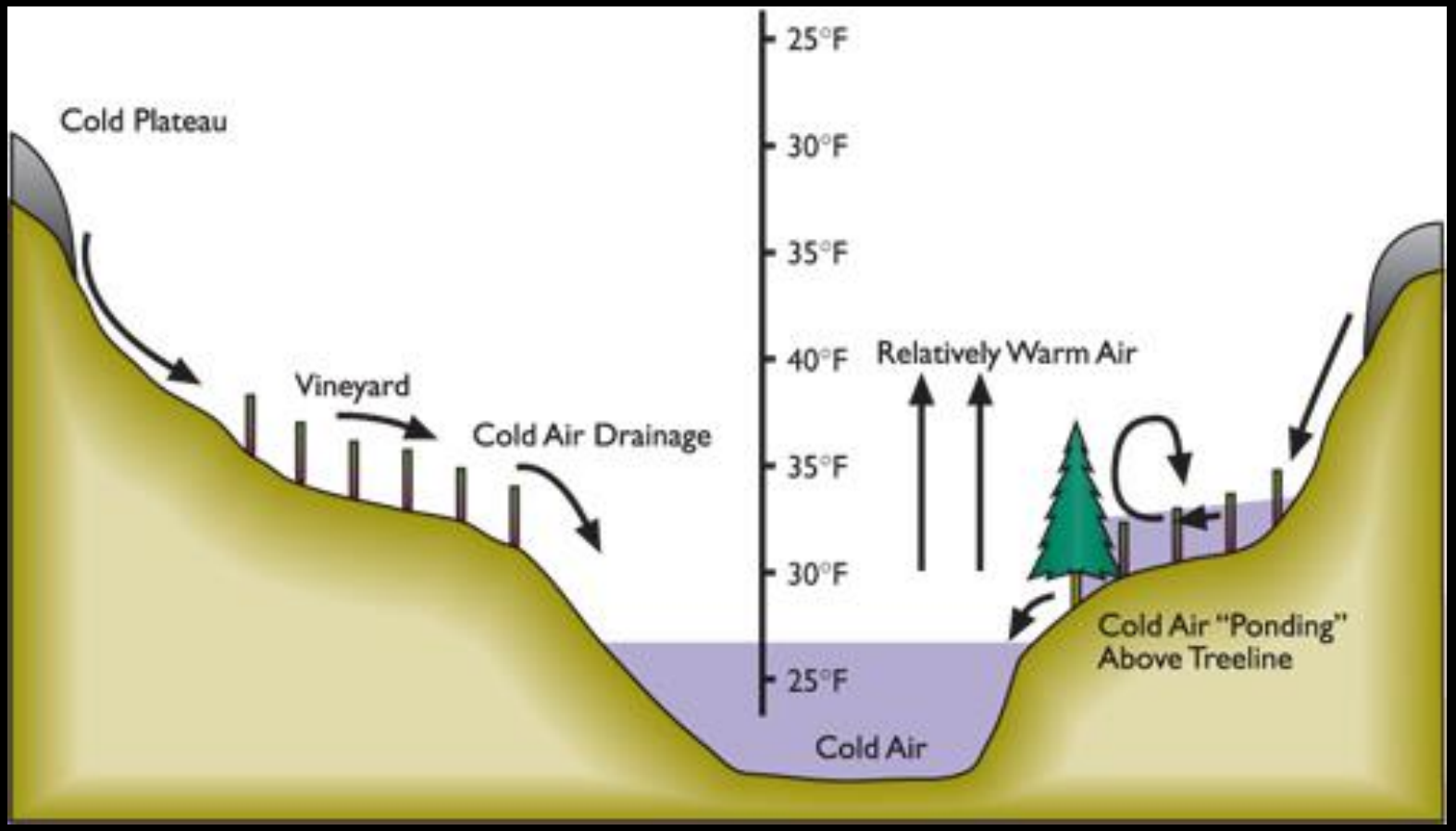
Cropping options		NUTRIENT REQUIREMENTS Pounds per acre*						LIMESTONE SUGGESTIONS	
		N	P_2O_5	K_2O	Zn	S	B	Effective neutralizing material (ENM)	1810
4	Grapes(New-planting)	40	50	0	5	0	0		
10	Grapes(Established)	20	40	0	0	0	0	Effective magnesium (EMg)	lbs/a 0

*To obtain a value of lb/1,000 square feet, divide the value of pounds per acre by 43.56

Comments:


pH
4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0
Strongly acid
Neutral →
Strongly alkaline
Nitrogen
Phosphorus
Potassium
Sulfur
Calcium
Magnesium
Iron
Manganese
Boron
Copper
Zinc
Molybdenum
pH
4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0
Results of soil test
Ideal pH for clay/loam soils
Ideal pH for sandy soils

Mesoclimate - Slope



https://www.todayshomeowner.com/diy-soil-drainage-perk-test-for-your-yard/

Mesoclimate - Slope

Mesoclimate - Slope

- Inclination or declination from horizontal
- 5 - foot fall over 100 – foot = 5% slope
- Slopes ≥ 15% are dangerous for equipment operation
- Greater the slope the faster cold air drains

https://www.todayshomeowner.com/diy-soil-drainage-perk-test-for-your-yard/

Mesoclimate - Aspect

Compass direction the slope faces

- South – early season warm up
  - Potential for early bud break
  - May help mature late ripening cultivars
- East – early morning warm up
  - Promotes dry-down of tissue and clusters
  - Decrease hot afternoon sun
- North – warms up latter compared to South
  - May delay bud-break on cultivars prone to early bud-break
- West – late afternoon and evening warm up
  - May help mature late ripening cultivars

Mesoclimate - Water

- Need water source
- Especially important during establishment

Image credit:
https://www.google.com/search?q=water&source=lnms&tbm=isch&sa=X&ved=0ahUKEwi3mM7viLLWAhVM42MKHcnVAOoQ_AUICigB&biw=1600&bih=767#imgrc=HY3RWLsmNzxBzM:

Mesoclimate - Vegetation

- Pasture Sites
  - Perennial plants
  - Herbicide history
    - Grazon Herbicide
    - Aminopyralid, clopyralid, picloram, triclopyr
    - Bioassay –green bean

Mesoclimate - Vegetation

IMPORTANT USE PRECAUTIONS AND RESTRICTIONS TO PREVENT INJURY TO DESIRABLE PLANTS

- Carefully read the section ***"Restrictions in Hay or Manure Use ."***
- It is mandatory to follow the ***"Use Precautions and Restrictions"*** section of this label.
- Manure and urine from animals consuming grass or hay treated with this product may contain enough aminopyralid to cause injury to sensitive broadleaf plants.
- Hay can only be used on the farm or ranch where product is applied unless allowed by supplemental labeling.
- Consult with a Dow AgroSciences representative if you do not understand the "Use Precautions and Restrictions". **Call [1-(800) 263-1196] Customer Information Group.**

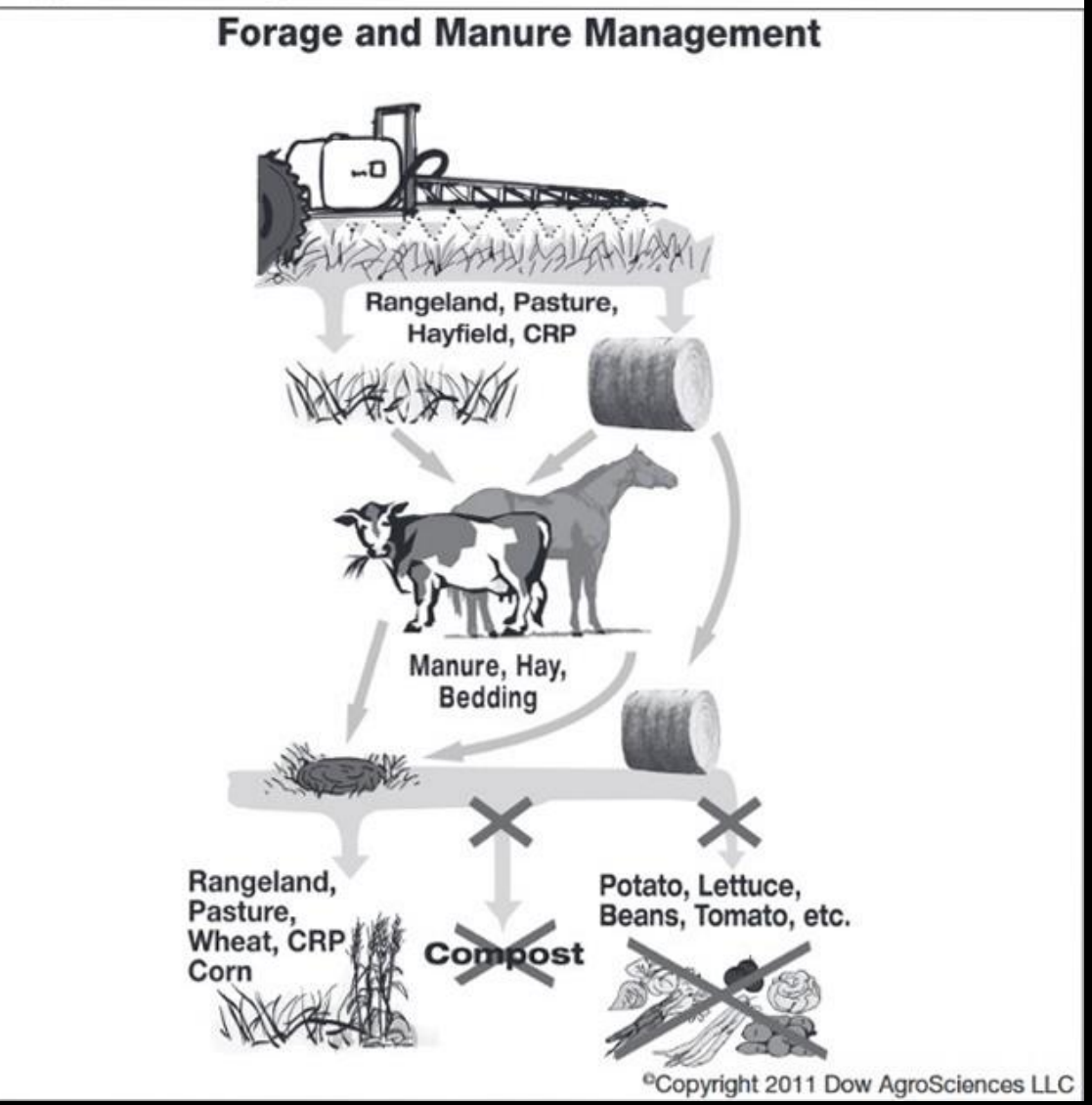
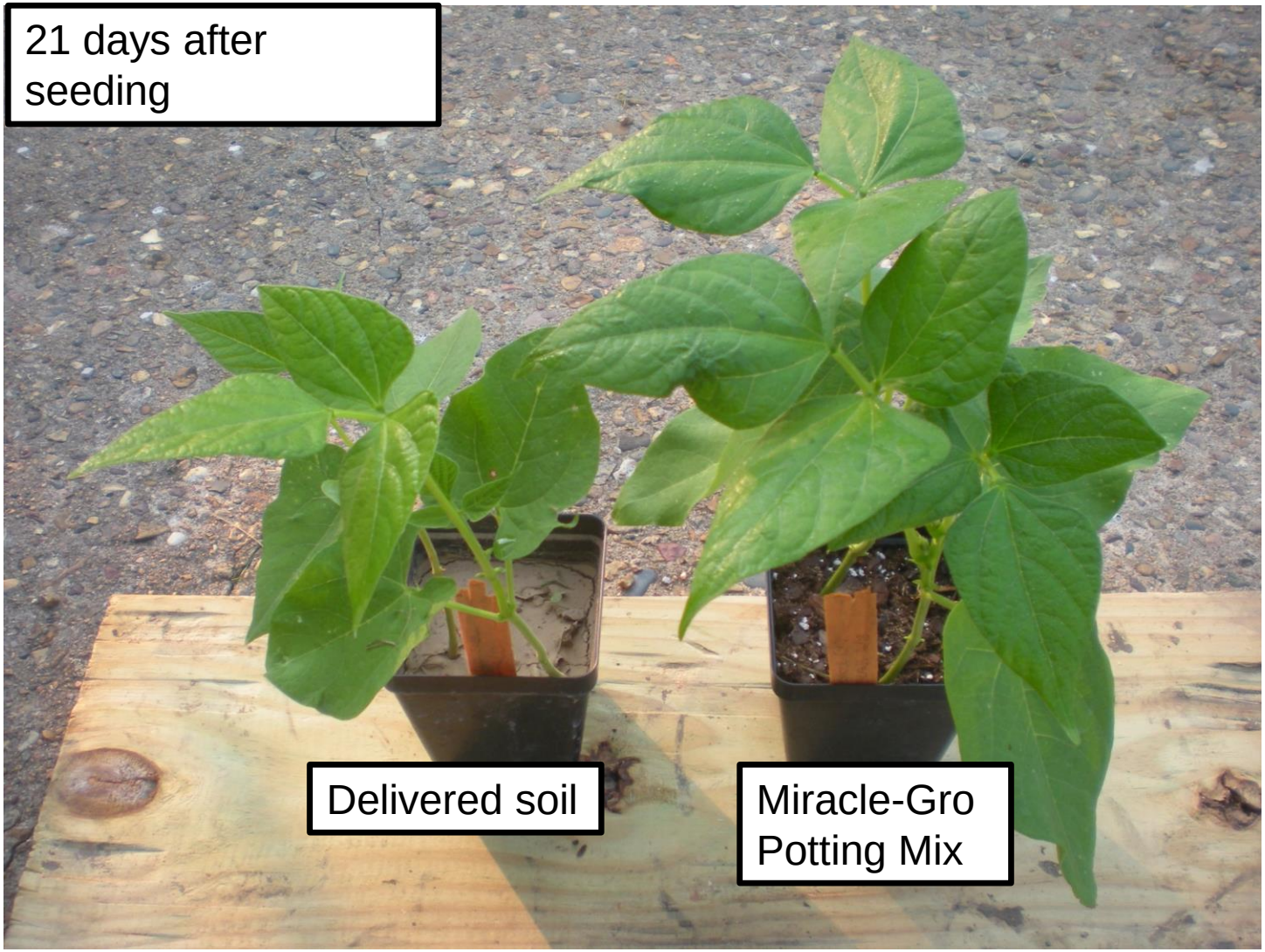
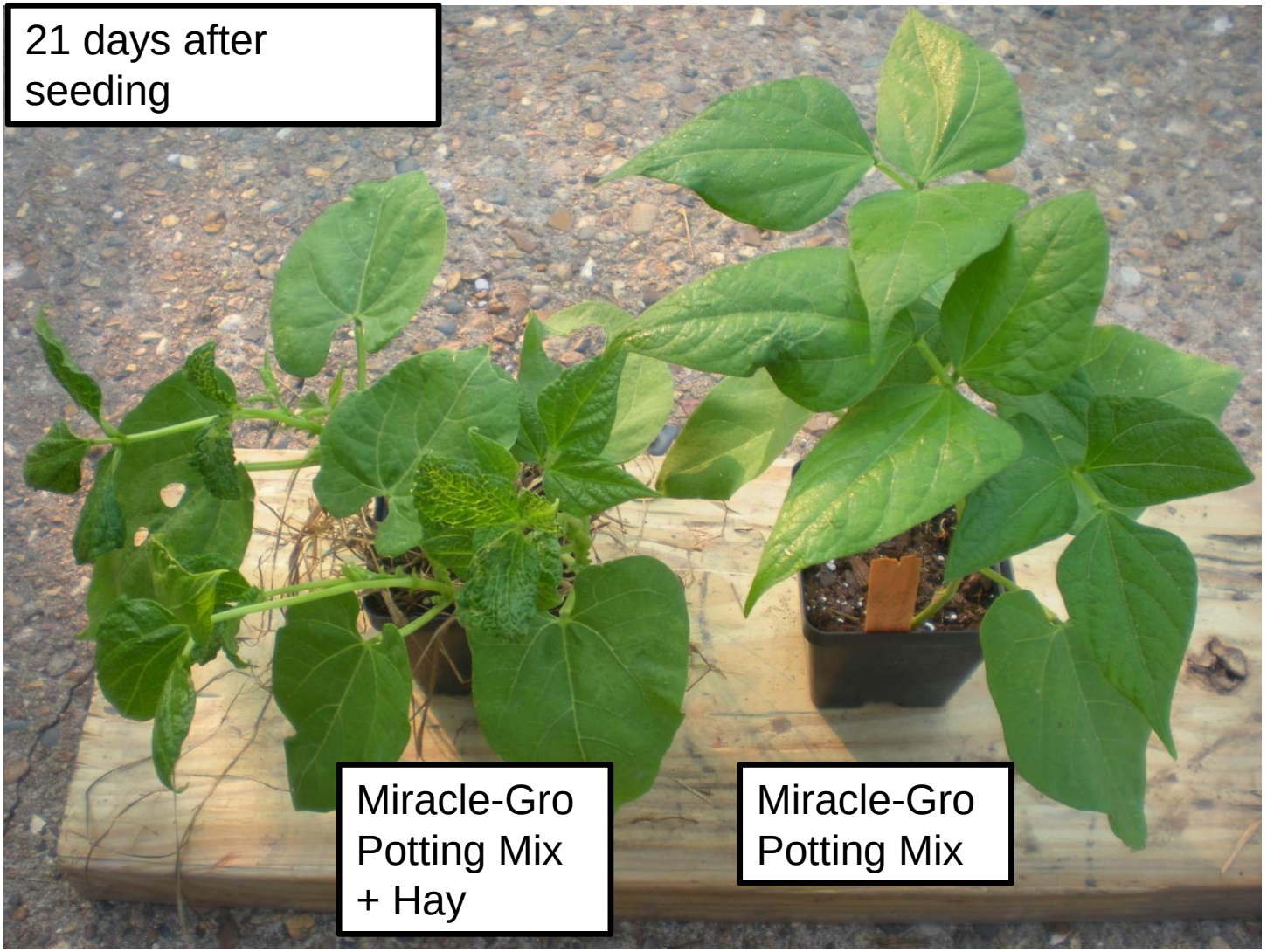
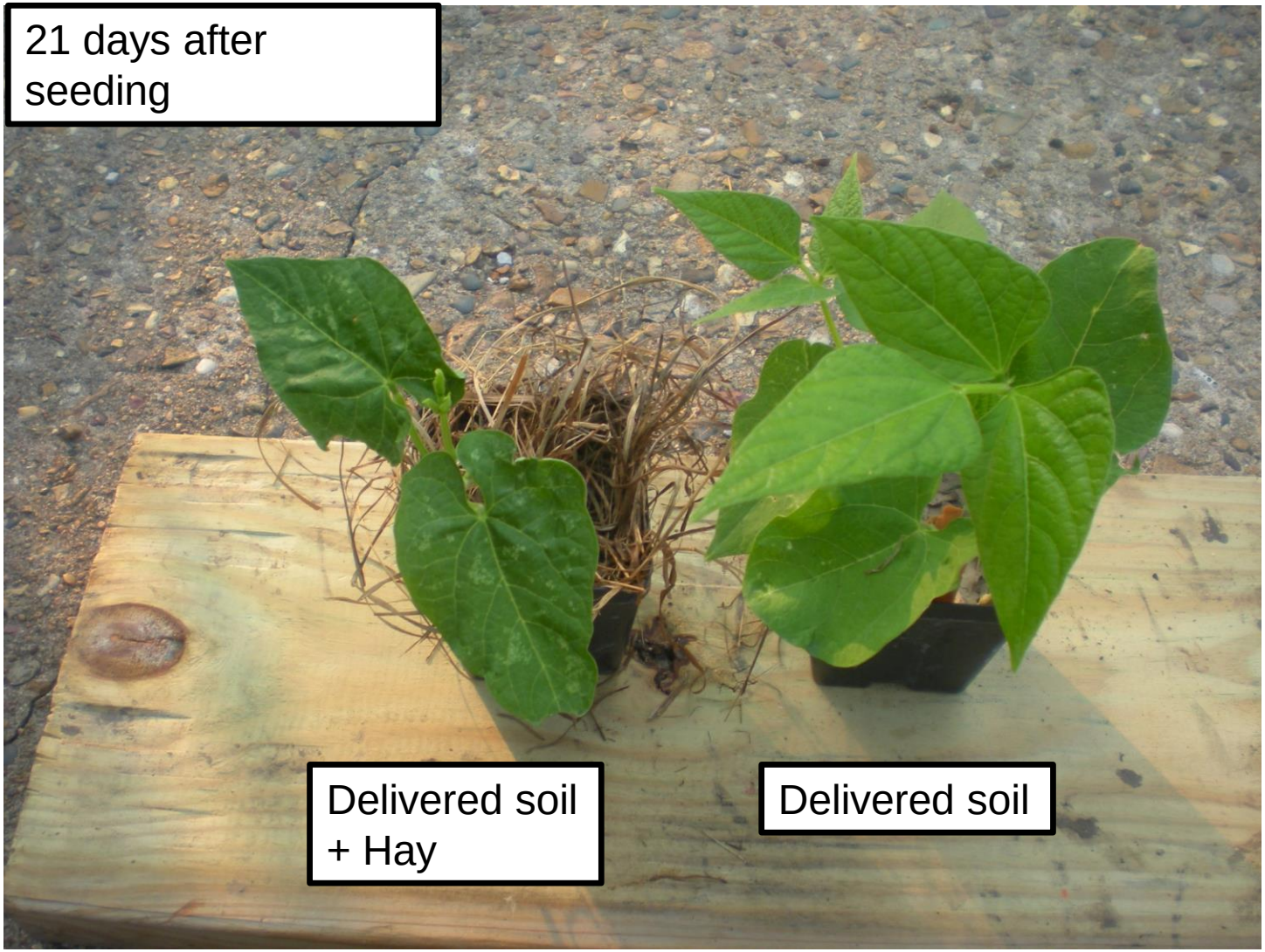
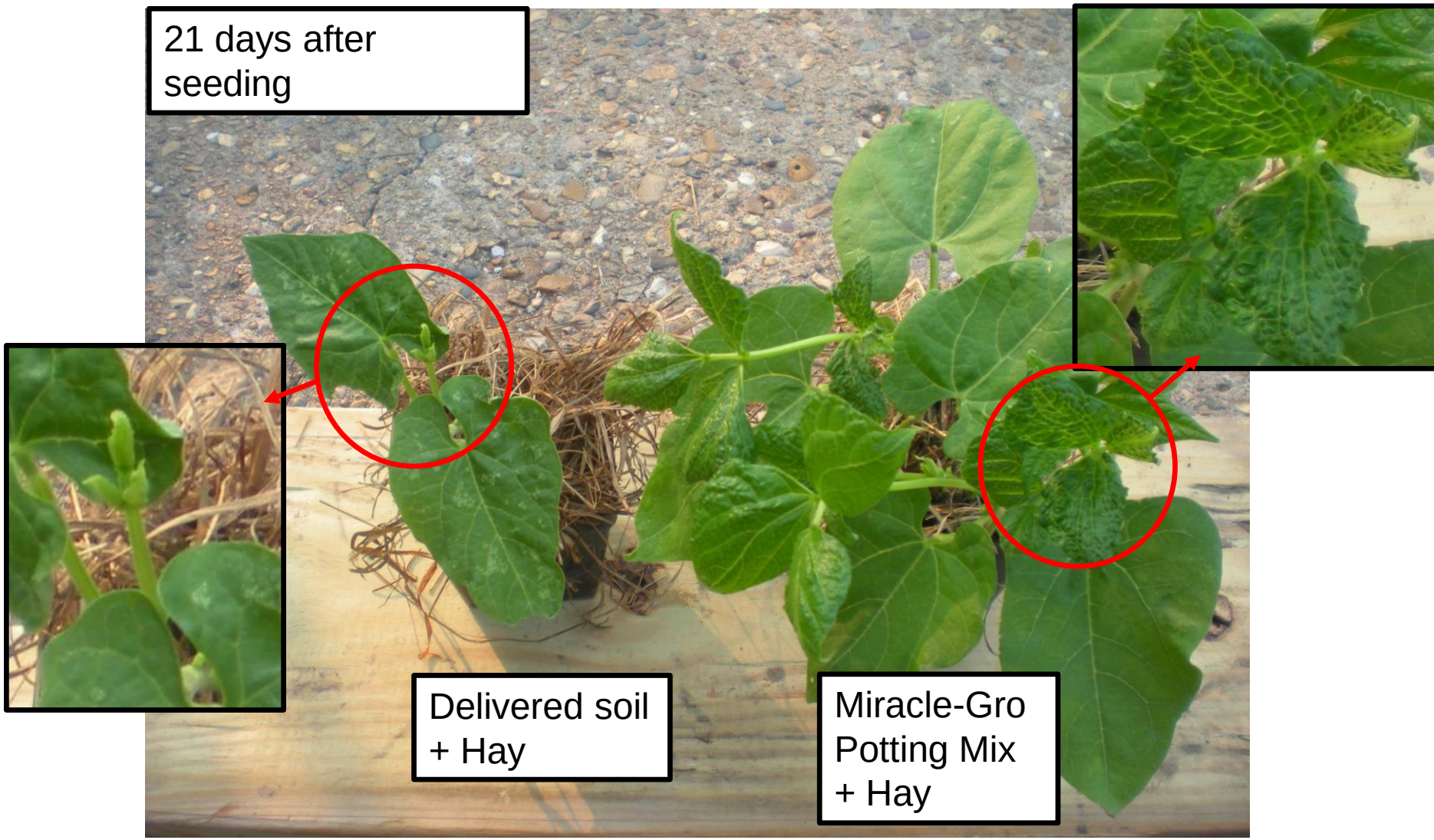


Image credit: http://www.cdms.net/ldat/ldA6K014.pdf


21 days after seeding
Delivered soil
Miracle-Gro Potting Mix


21 days after seeding
Miracle-Gro Potting Mix + Hay
Miracle-Gro Potting Mix


21 days after seeding
Delivered soil + Hay
Delivered soil


21 days after seeding
Delivered soil + Hay
Miracle-Gro Potting Mix + Hay

HERBICIDE CARRYOVER IN HAY, MANURE, COMPOST, AND GRASS CLIPPINGS:

Caution to Hay Producers, Livestock Owners, Farmers, and Home Gardeners

Many farmers and home gardeners have reported damage to vegetable and flower crops after applying horse or livestock manure, compost, hay, or grass clippings to the soil. The symptoms reported include poor seed germination; death of young plants; twisted, cupped, and elongated leaves; misshapen fruit; and reduced yields. These symptoms can be caused by other factors, including diseases, insects, and herbicide drift. Another possibility for the source of these crop injuries should also be considered: the presence of certain herbicides in the manure, compost, hay, or grass clippings applied to the soil.

THE HERBICIDES OF CONCERN

Aminopyralid, clopyralid, and picloram are in a class of herbicides known as *pyridine carboxylic acids*. They are registered for application to pasture, grain crops, residential lawns, commercial turf, certain vegetables and fruits, and roadsides (Table 1). They are used to control a wide variety of broadleaf weeds including several toxic plants that can sicken or kill animals that graze them or eat them in hay. Based on USDA-EPA and European Union agency evaluations, when these herbicides are applied to hay fields or pasture, the forage can be safely consumed by horses and livestock—including livestock produced for human consumption. These herbicides pass through the animal's digestive tract and are excreted in urine and manure. They can also remain active in the manure even *after* it is composted. The herbicides can also remain active in hay, straw, and grass clippings taken from

Table 1. Herbicides registered for use in North Carolina that contain picloram, clopyralid, and aminopyralid

Pasture and hayfields	Commercial turf and lawns	Commercial vegetables and fruits
Curtail (2,4-D + clopyralid)	Confront (triclopyr + clopyralid)	Clopyr AG (clopyralid)
Forefront (aminopyralid + 2,4-D)	Lontrel (clopyralid)	Stinger (clopyralid)
GrazonNext (aminopyralid + 2,4-D)	Millennium Ultra Plus (MSMA + 2,4-D + clopyralid + dicamba)	
Grazon P + D (picloram + 2,4-D)	Millennium Ultra and Ultra 2 (2,4-D + clopyralid + dicamba)	
Milestone (aminopyralid)		
Redeem R&P (triclopyr + clopyralid)		
Surmount (picloram + fluroxypyr)		

All products listed are manufactured by Dow Agrosciences, LLC with the exceptions of the Millennium products by Nufarm Americas Inc. and Clopyr AG by United Phosphorus, Inc.. Herbicide product names and formulations change; always check labels for active ingredients.

NC State University A&T State University COOPERATIVE EXTENSION
Empowering People • Providing Solutions

http://content.ces.ncsu.edu/herbicide-carryover.pdf

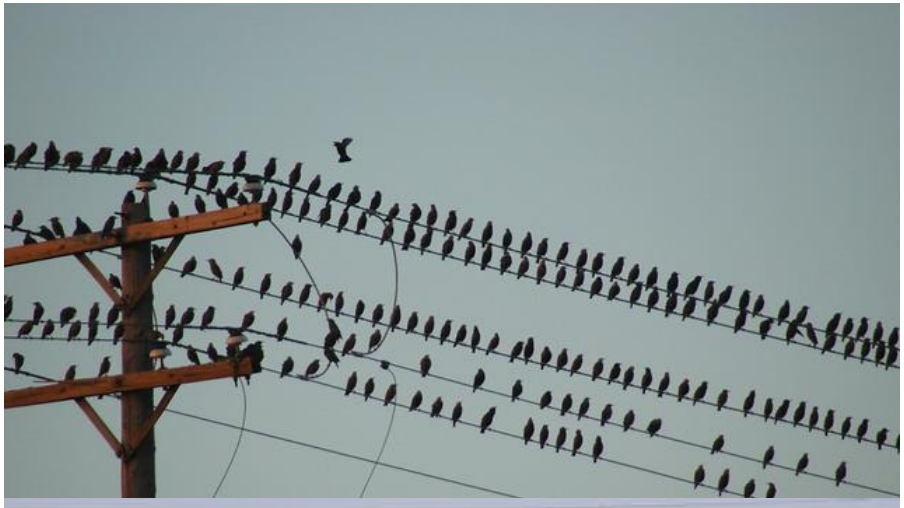
Also see Contaminated Compost by Debbi Kelly

Mesoclimate – Cropping History

- Abandoned Orchard Sites – Lead arsenate, copper acetoaresenate – “Paris green, and calcium arsenate

IPM & Vineyard Site Selection

- Look Up
  - Birds
  - Trees
- Look Around
  - Know your neighbor
  - Know their crops



IPM & Vineyard Site Selection

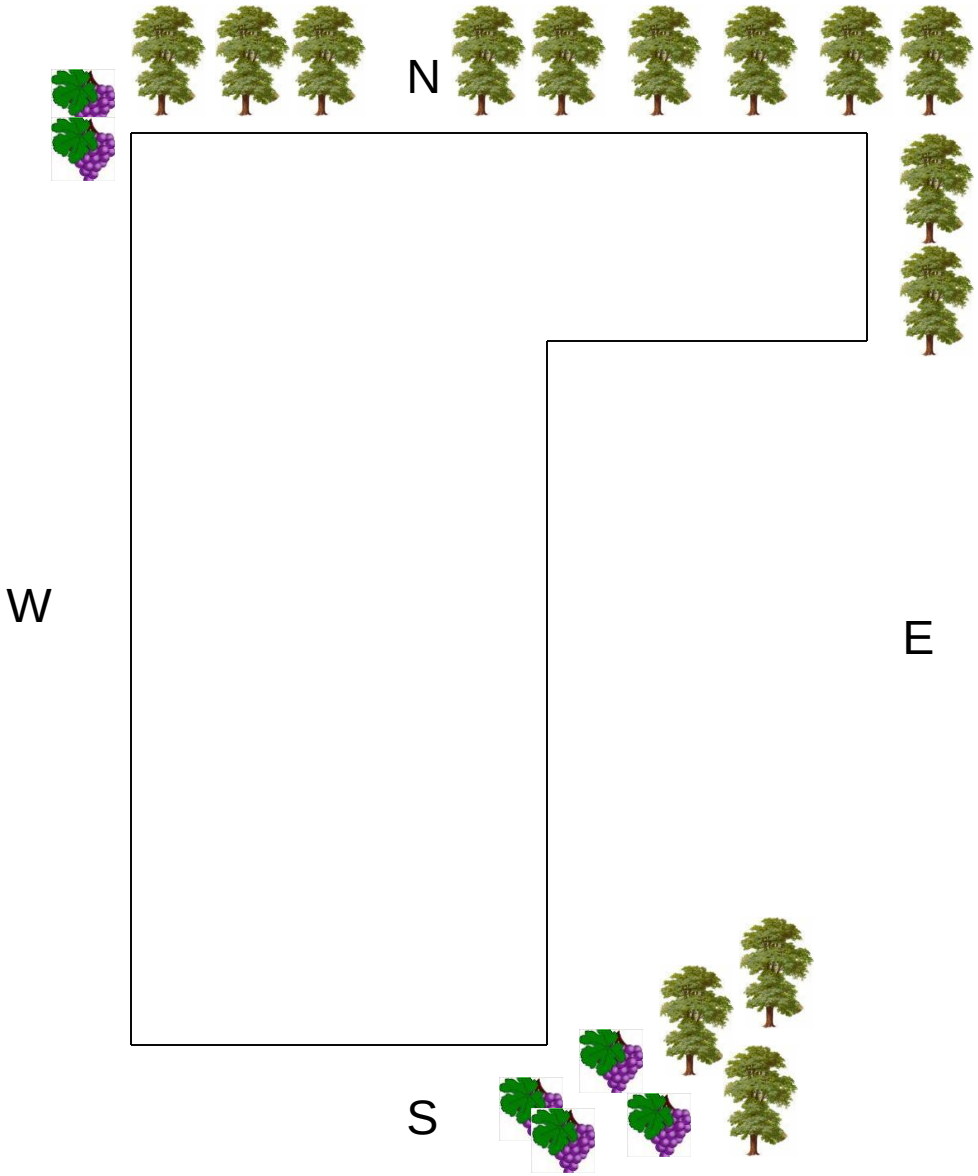
- Phenoxy herbicide injury
  - 2,4-D
  - Dicamba
  - Clopyralid
  - Triclopyr

Other Herbicide Off-Target Sources

- Homeowners lawns
- Golf courses
- Highway Right-of-way
- Invasive plant management

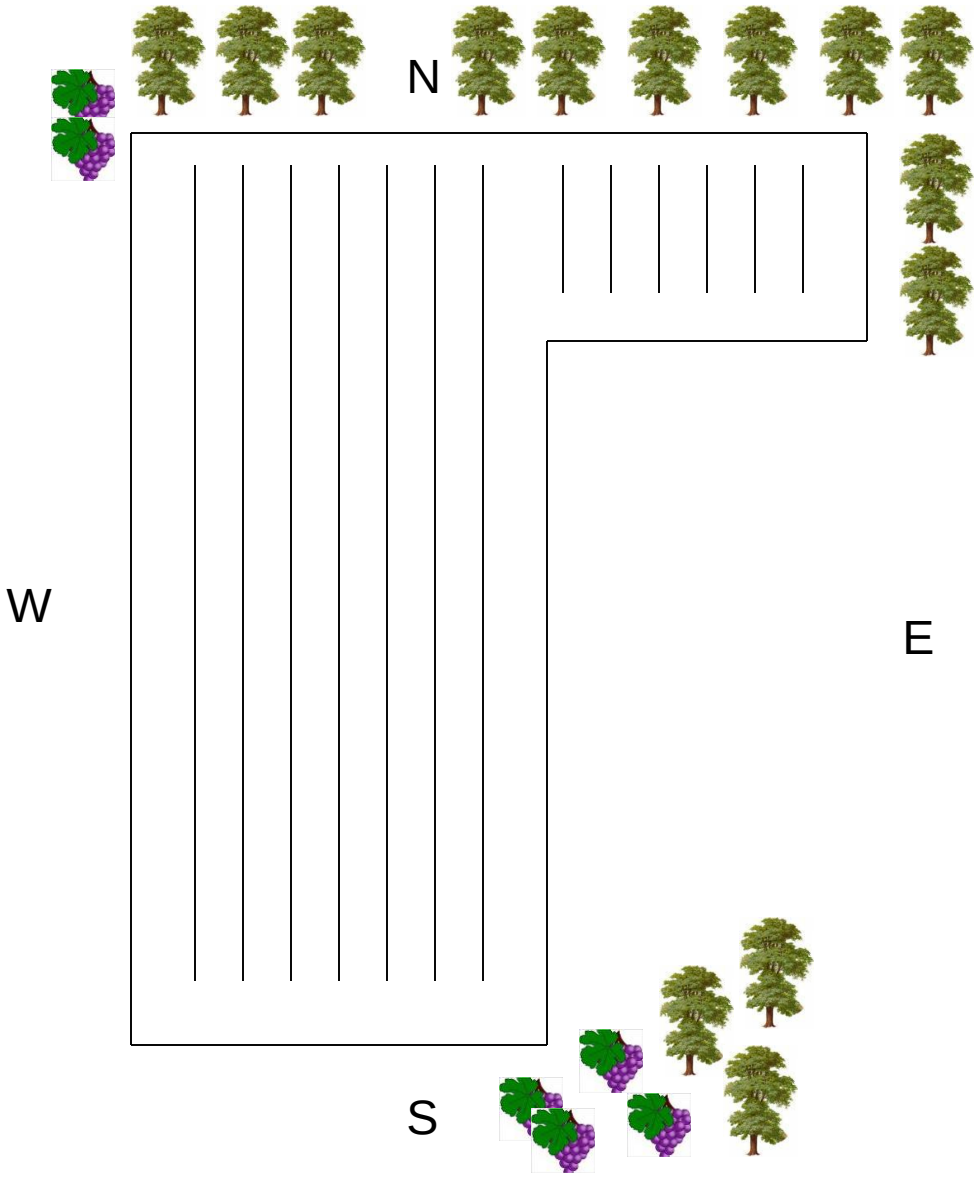
IPM & Vineyard Site Selection

- Map your site and surroundings



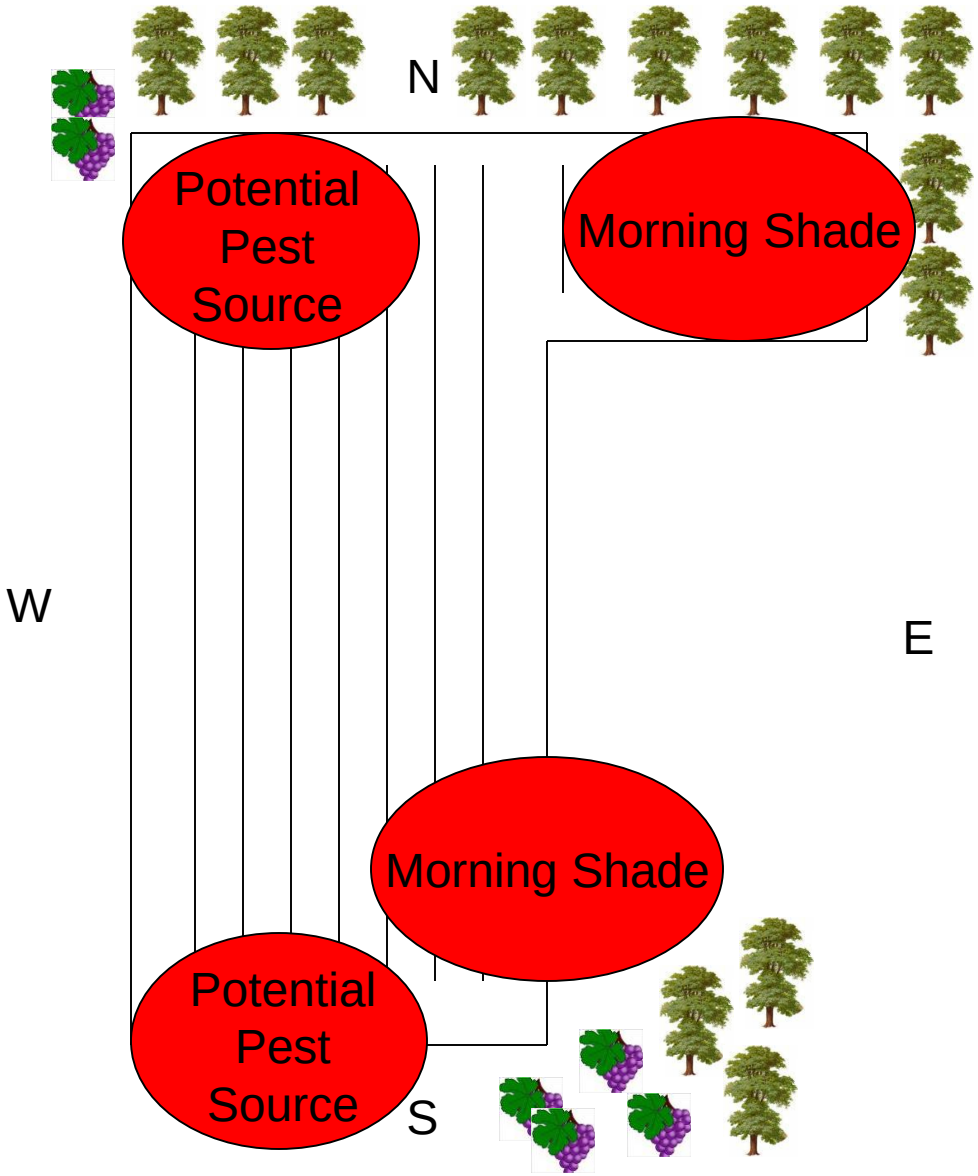
IPM & Vineyard Site Selection

- Map your site and surroundings
- Lay out rows



IPM & Vineyard Site Selection

- Map your site and surroundings
- Lay out rows
- Identify potential problem pest areas



IPM & Vineyard Site Selection

- Map your site and surroundings
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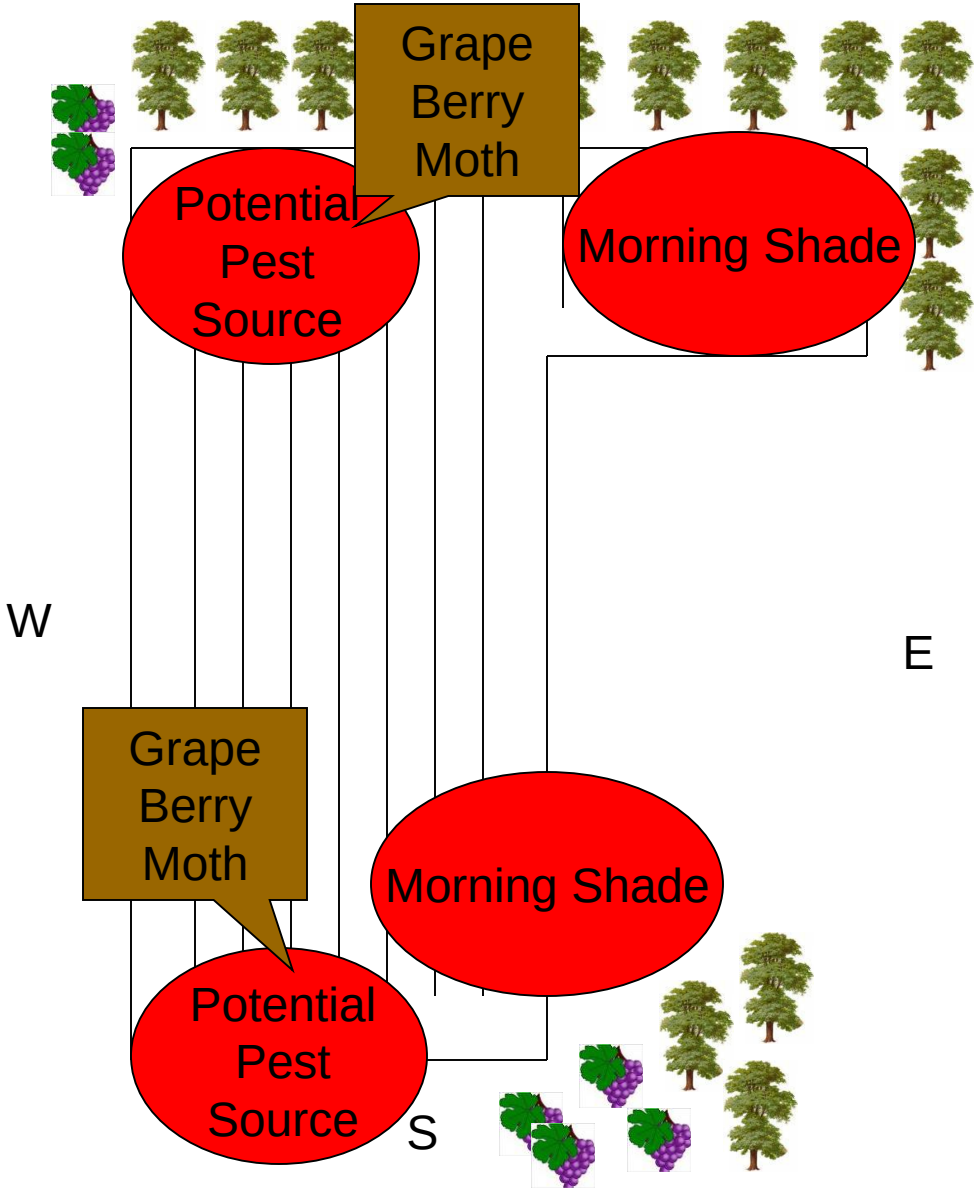

Microclimate

- Trellis training system
- Dormant pruning
- Canopy management
- Weed management
- Insect and disease management

Common Mistakes Along the Way

- Planting at the bottom of a slope
- Planting in swales
- Planting with high water table
- Planting near row crops
- Site located next to golf course
- Site surrounded by woods
- Site with unknown cropping or pesticide history
- Site was a capped sanitary landfill

Your Site Should Have a Story

- Besides having the physical and environmental features
- Does the site have a history
- Does the site have culture
- Does the site have family roots – living history
- Can you connect your site to the consumer – does it tell a story that the consumer will remember

Dean S. Volenberg

Viticulture and Winery Operations Extension Specialist

214C Waters Hall

volenbergd@Missouri.edu

573-882-0476