

Vineyard Site Selection

Advanced Beginner Grape School

6 March 2020

Dean S. Volenberg

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?





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-](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=wt&imgs=1p&filter=on&imgDetail=true)

[E3B6D4D369ED&qs=&searchfor=manure+pit+in+missouri&si=245051_Weather-US-B&ss=sub&st=tab&tpr=sbt&trs=wt&imgs=1p&filter=on&imgDetail=true](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=wt&imgs=1p&filter=on&imgDetail=true)

Site Selection

- Macroclimate – region
- Mesoclimate – vineyard site
- Microclimate – area around vine
- Macroclimate
 - Winter temperatures
 - $\leq -20^{\circ}\text{F}$ (-40°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

The screenshot shows a web browser window displaying the MRCC Climate of the Midwest website. The page title is "Climate of the Midwest | Climate Summaries - Windows Internet Explorer". The URL in the address bar is http://mrcc.sws.uiuc.edu/climate_midwest/mwclimate_data_summaries.htm. The website features a navigation menu with options like "Midwest Climate Watch", "cli-MATE", "HOME", "CONTACT", and "SITEMAP". The main content area is titled "CLIMATE OF THE MIDWEST" and includes a sub-menu with "Climate Watch", "Climate Summaries", "Climate Change", "Climate Calendars", and "Living With Wx". Under "Climate Summaries", there are buttons for "Climate Summaries", "Climate Perspectives", "US Temp Extremes", and "Climatology References". The "Climate Summaries" button is selected, leading to a section titled "Choose a station by map location:". This section contains a map of the Midwest with a blue dot indicating a station location. Below the map, there is a text input field for "or choose by station name:". A dropdown menu for "Choose a State:" is set to "Wisconsin", and a dropdown menu for "Choose a Station:" is set to "AFTON, ROCK CO.". There is a "Go" button next to the station dropdown. Below these fields are radio buttons for "Temperature", "Precipitation", "Snow", and "Growing Season", with "Temperature" selected. A paragraph of text explains the data source: "The source of the data in these products comes from the U.S. Cooperative Network, augmented by observations from the relatively small number of NWS sites. These cooperative sites are operated by volunteer observers using approved instruments and observing techniques. It is only through their efforts that we have long-term data for such a large number of sites." At the bottom of the page, there are navigation links: "[Climate Watch] [**Climate Summaries**] [Climate Change] [Climate Calendars] [Living With Weather]". The browser's taskbar at the bottom shows the start button, several open applications, and the system tray with the time 6:33 PM.

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

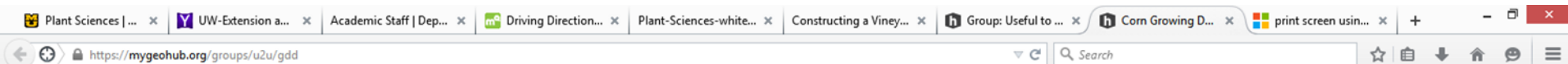
- Degree Days (DD) = average daily temperature - base temperature which =

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

- Example: Calculate DD base 50, given 70 degrees maximum temperature and 35 degrees minimum temperature
- $DD \text{ (base 50)} = (70 + 35)/2 - 50 = 2.5$
- If answer is negative assume 0 DD

Climate Decision Dashboard

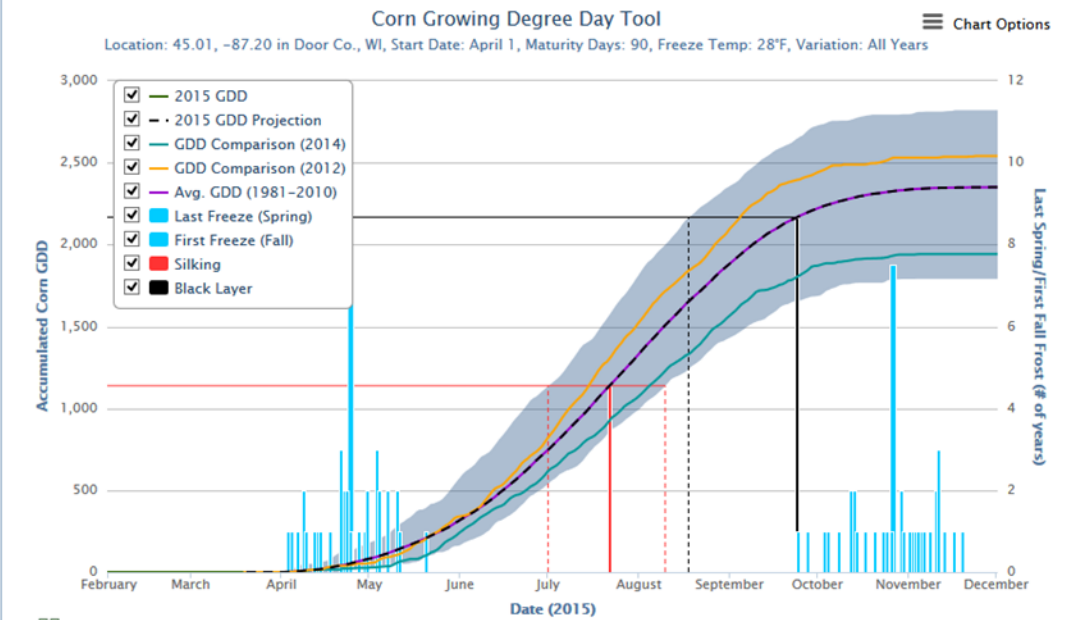
<https://mygeohub.org/groups/u2u/tools>



Map Graph Data Animations Feedback? About GDD

- This tab allows you to put corn (86/50) GDD progress into a 30-year historical perspective. Customize your data:
- Choose your GDD start date, freeze temperature threshold and corn maturity rating
 - Add up to 3 years from 1981 to previous year for comparison
 - Adjust the spread of historical GDD and temperature data visible on the graph
 - Add or remove silking, black layer and freeze dates for a comprehensive growing cycle snapshot

GDD Start: April 1 Comparison Years: 2014 2012 Corn Maturity Days: 90 Silking GDDs: 1132
Freeze Temperature (°F): 28 Variation: All Years Current Day: Today Black Layer GDDs: 2159

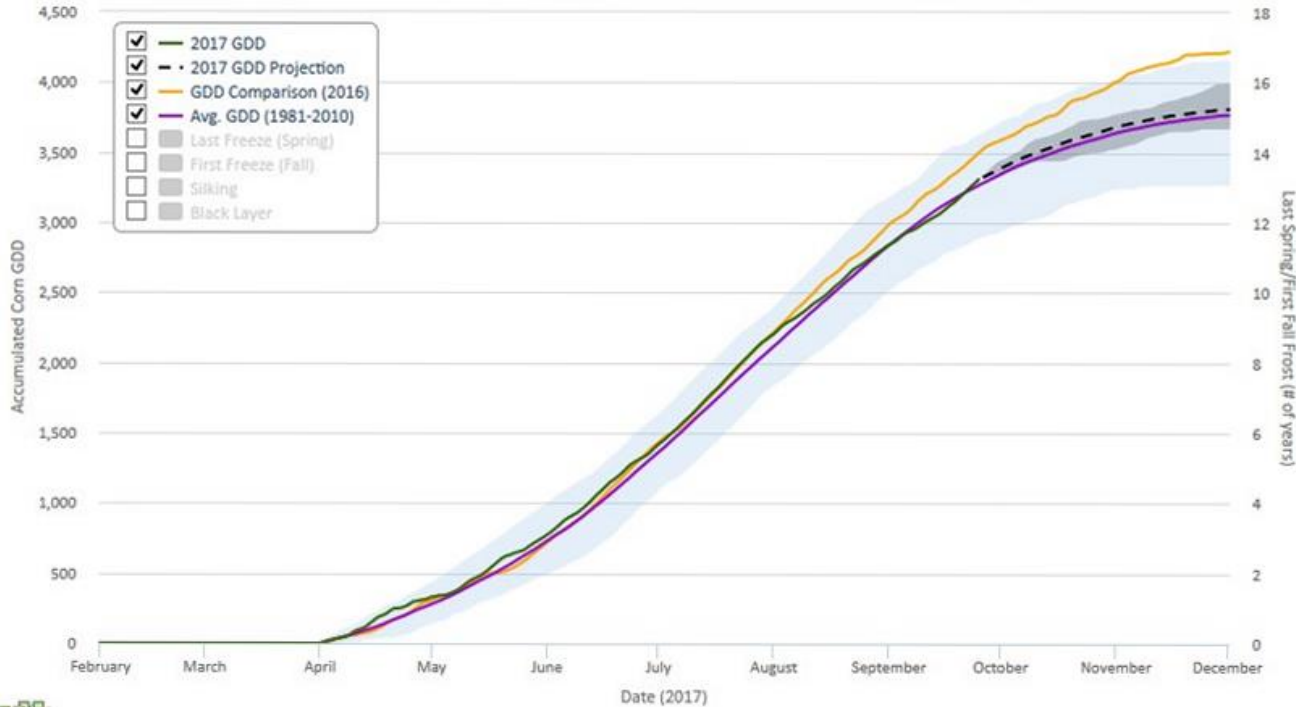


GDD Start: April 1 Comparison Years: 2016 Corn Maturity Days: 113 Silking GDDs: 1395
 Freeze Temperature (°F): 28 Variation: All Years Current Day: Today Black Layer GDDs: 2715

Corn Growing Degree Day Tool

Chart Options

Location: 38.44, -91.58 in Gasconade Co., MO, Start Date: April 1, Maturity Days: 113, Freeze Temp: 28°F, Variation: All Years



Site Selection

USDA Plant Hardiness Zone Map - Windows Internet Explorer

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

File Edit View Favorites Tools Help

U.S. Commercial Bushel Sizes ONE-WAY ANOVA Repair XP \$11179 HP d-v7-7012re, HP P... http-download.lenovo.com...

USDA Plant Hardiness Zone Map

USDA Agricultural Research Service
United States Department of Agriculture

Mapping by PRISM Climate Group - Oregon State University

Stay Connected

Home View Maps About Map & Data Downloads Interactive Map Help

Find Your Plant Hardiness Zone
Enter ZIP Code: 54801 Find
Zone 3b : -35 to -30 (F)

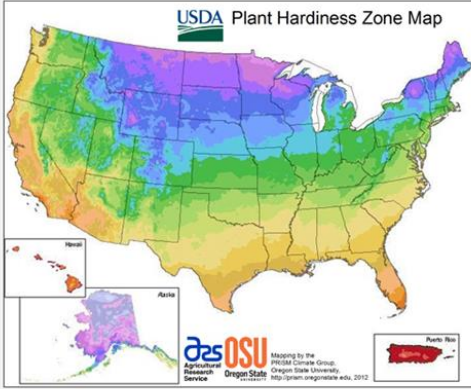
View Your State Map
For a static map of your state, click on the map below or Select a State

USDA Plant Hardiness Zone Map

The 2012 USDA Plant Hardiness Zone Map is the standard by which gardeners and growers can determine which plants are most likely to thrive at a location. The map is based on the average annual minimum winter temperature, divided into 10-degree F zones.

For the first time, the map is available as an interactive GIS-based map, for which a broadband Internet connection is recommended, and as static images for those with slower Internet access. Users may also simply type in a ZIP Code and find the hardiness zone for that area.

No posters of the USDA Plant Hardiness Zone Map have been printed. But state, regional, and national images of the map can be downloaded and printed in a variety of sizes and resolutions.



USDA Plant Hardiness Zone Map

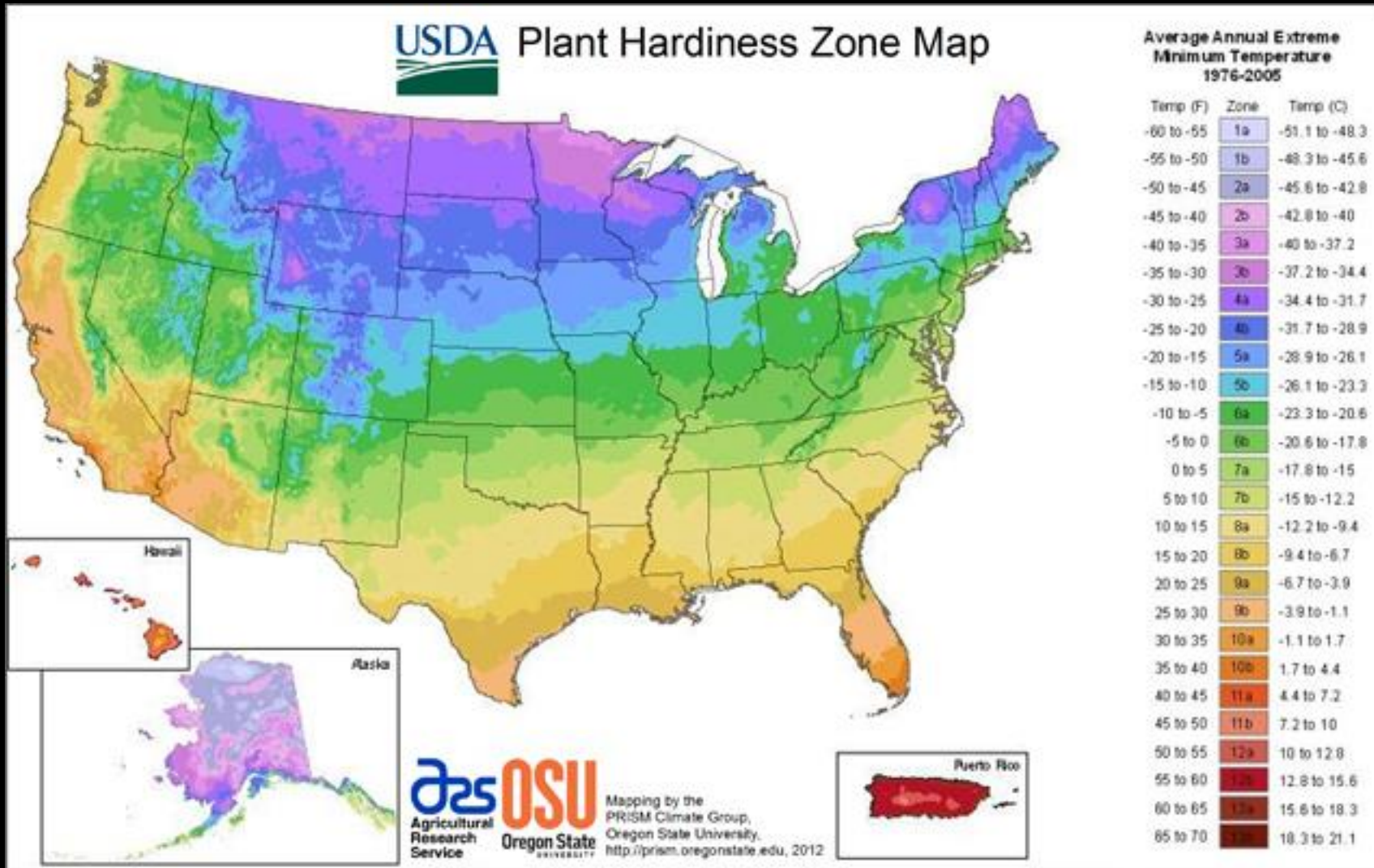
Temp (F)	Zone	Temp (C)
-80 to -55	1a	-51.1 to -48.3
-55 to -50	1b	-48.3 to -45.6
-50 to -45	2a	-45.6 to -42.8
-45 to -40	2b	-42.8 to -40
-40 to -35	3a	-40 to -37.2
-35 to -30	3b	-37.2 to -34.4
-30 to -25	4a	-34.4 to -31.7
-25 to -20	4b	-31.7 to -28.9
-20 to -15	5a	-28.9 to -26.1
-15 to -10	5b	-26.1 to -23.3
-10 to -5	6a	-23.3 to -20.6
-5 to 0	6b	-20.6 to -17.8
0 to 5	7a	-17.8 to -15
5 to 10	7b	-15 to -12.2
10 to 15	8a	-12.2 to -9.4
15 to 20	8b	-9.4 to -6.7
20 to 25	9a	-6.7 to -3.9
25 to 30	9b	-3.9 to -1.1
30 to 35	10a	-1.1 to 1.7
35 to 40	10b	1.7 to 4.4
40 to 45	11a	4.4 to 7.2
45 to 50	11b	7.2 to 10
50 to 55	12a	10 to 12.8
55 to 60	12b	12.8 to 15.6
60 to 65	13	15.6 to 18.3
65 to 70	14	18.3 to 21.1

Mapping by the PRISM Climate Group, Oregon State University. http://prism.oregonstate.edu, 2012

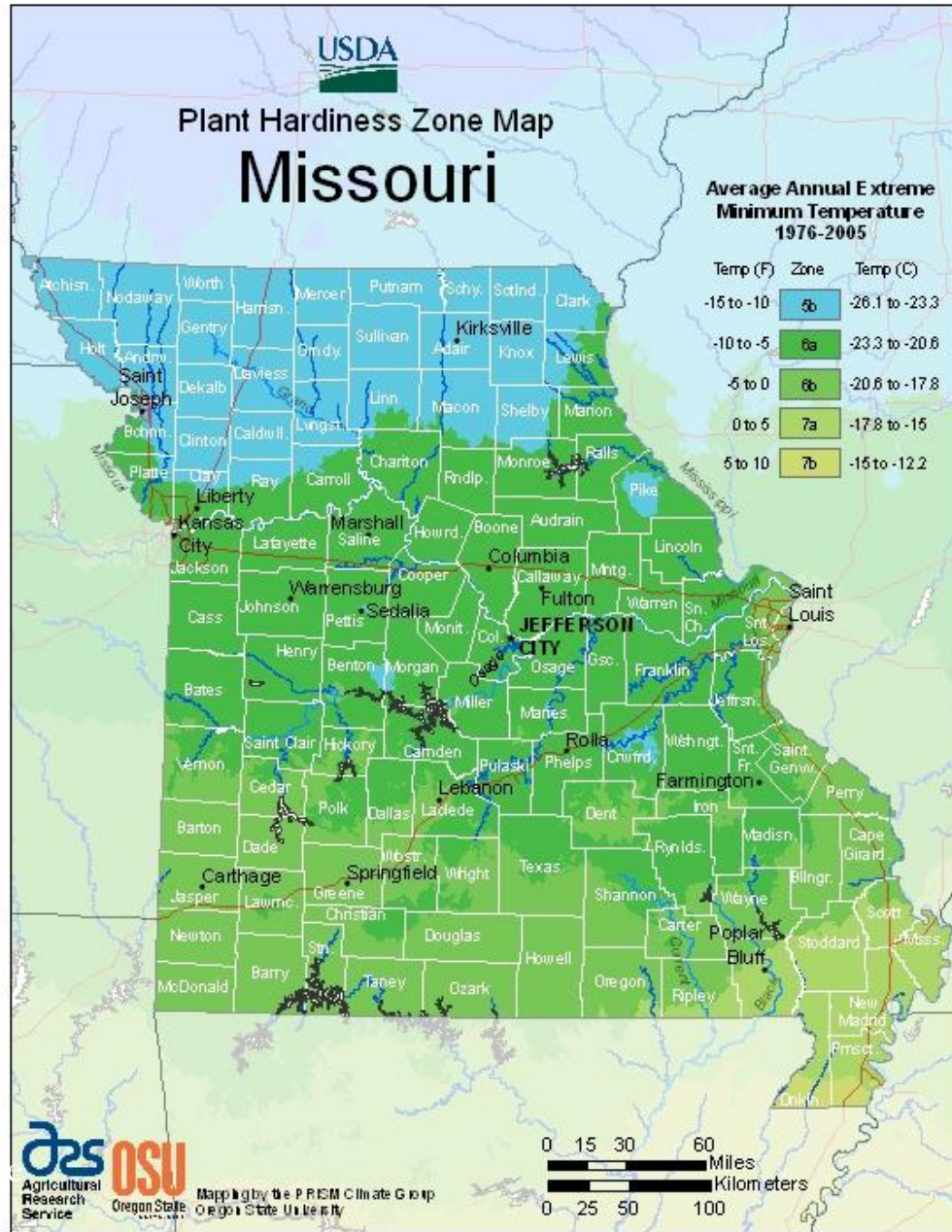
USDA.gov | Site Map | Policies & Links | Our Performance | Report Fraud on USDA Contracts | Visit OIG | Plain Writing | Open FOIA | Accessibility Statement | Privacy Policy | Non-Discrimination Statement | Information Quality | USA.gov | Whitehouse.gov

start 2. M E. R. W. U. S. G. S. Internet 100% 11:49 AM

Macroclimate



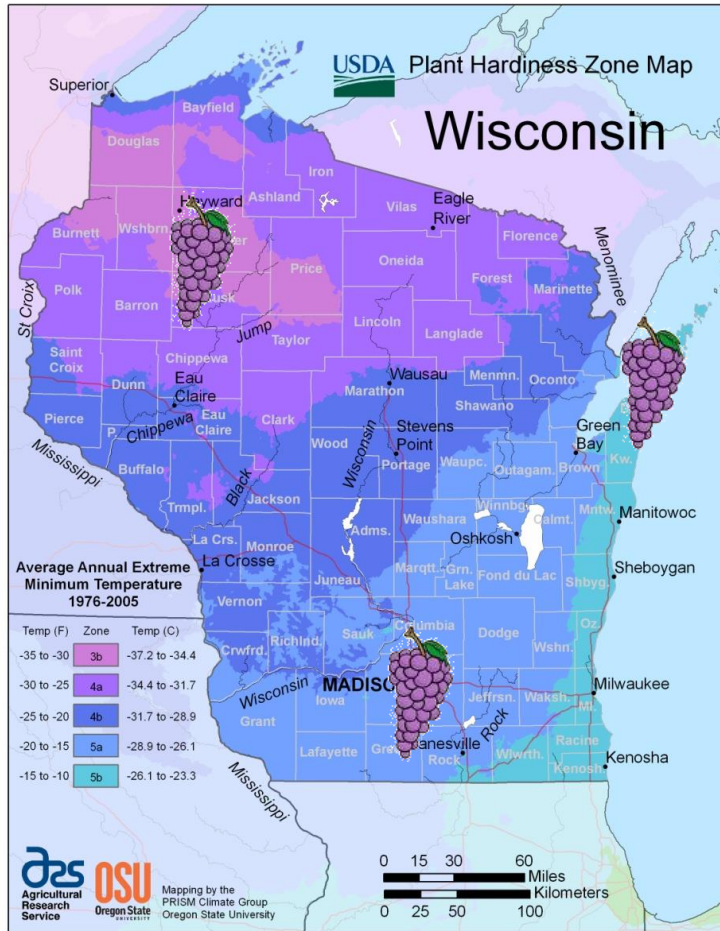
Macroclimate



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

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

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

Macroclimate



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 SoilWeb
- 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.

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



SSURGO Map
Units



STATSGO Map
Units

**REAL TIME SOIL
DESCRIPTIONS BASED
ON YOUR CURRENT
LOCATION**

Soil Resources

Web Soil Survey - Home - Windows Internet Explorer

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

File Edit View Favorites Tools Help

Web Soil Survey - Home

USDA United States Department of Agriculture Natural Resources Conservation Service

Web Soil Survey

Home About Soils Help Contact Us

You are here: Web Soil Survey Home

Search

Enter Keywords

All NRCS Sites

Browse by Subject

- Soils Home
- National Cooperative Soil Survey (NCSS)
- Archived Soil Surveys
- Status Maps
- Official Soil Series Descriptions (OSD)
- Soil Series Extent Mapping Tool
- Geospatial Data Gateway
- eFOG
- National Soil Characterization Data
- Soil Geochemistry Spatial Database
- Soil Quality
- Soil Geography

The simple yet powerful way to access and use soil data.

START WSS

Welcome to Web Soil Survey (WSS)

Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is online as the single authoritative source.

Soil surveys can be used for general farm, local, and wider area planning. Onsite investigation is needed in some cases, such as soil quality assessments and certain conservation and engineering applications. For more detailed information, contact your local [USDA Service Center](#) or your [NRCS State Soil Scientist](#).

Four Basic Steps

- 1 Define...

Area of Interest (AOI) Use the Area of Interest tab to define your area of interest.

Click to view larger image.

- 2 View...

I Want To...

- Start Web Soil Survey (WSS)
- Know the requirements for running Web Soil Survey – will Web Soil Survey work in my web browser?
- Know the Web Soil Survey hours of operation
- Find what areas of the U.S. have soil data
- Find information by topic
- Know how to hyperlink from other documents to Web Soil Survey

Announcements/Events

- Web Soil Survey 3.0 has been released! View description of new features.
- Web Soil Survey Release History
- Sign up for e-mail updates via GovDelivery

I Want Help With...

- Getting Started With Web Soil Survey
- How to use Web Soil Survey
- How to use Web Soil Survey Online Help
- Known Problems and Workarounds
- Frequently Asked

http://www.cei.psu.edu/soiltool/

Internet 100%

1:28 PM

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

Interactive Map

ZIP Code:

Choose Location:

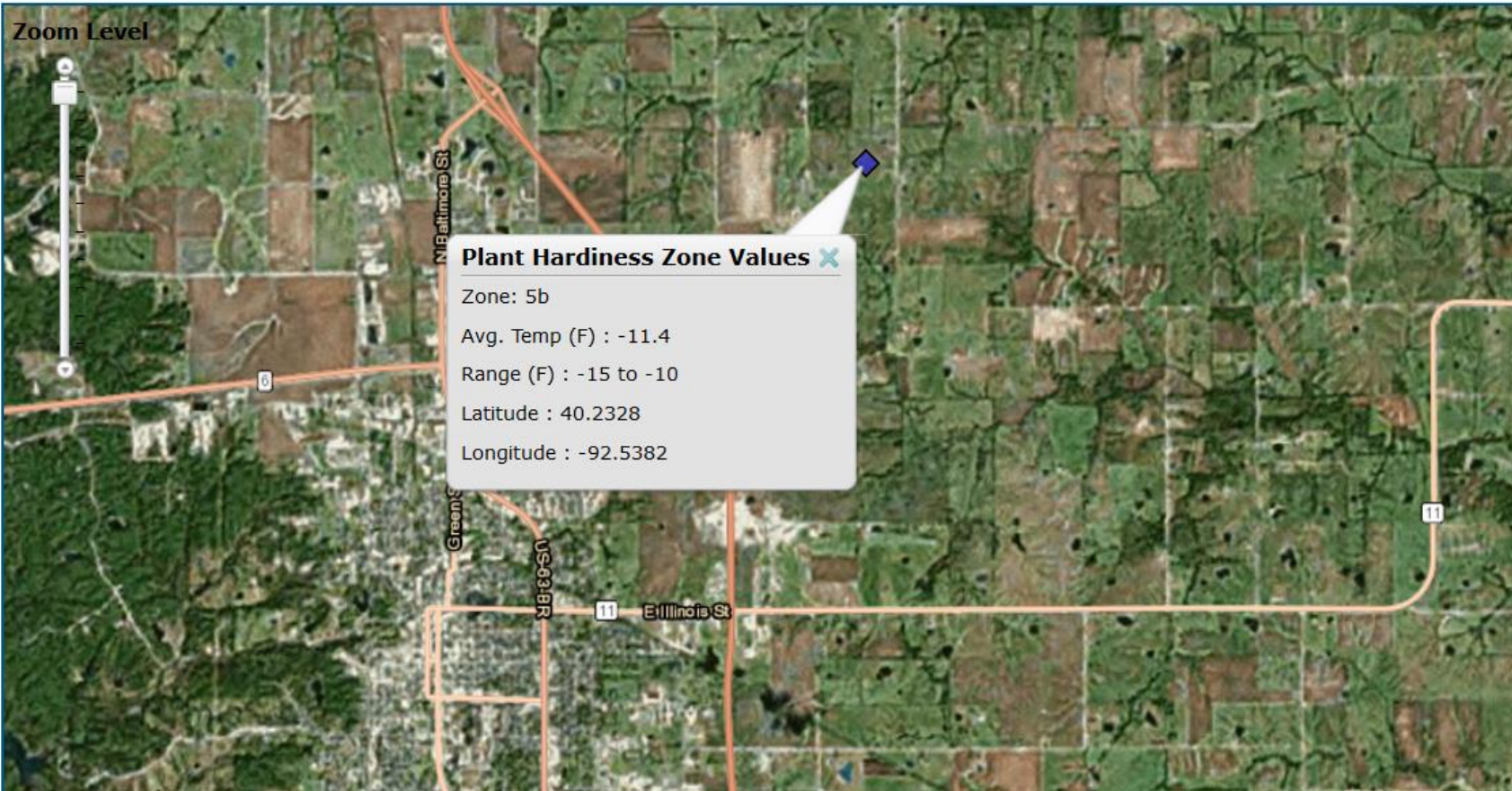
Choose Basemap:

Turn on Basemap Roads and Labels

[Help with this Map](#)

Zone Color Transparency

Zoom Level



Mesoclimate

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)

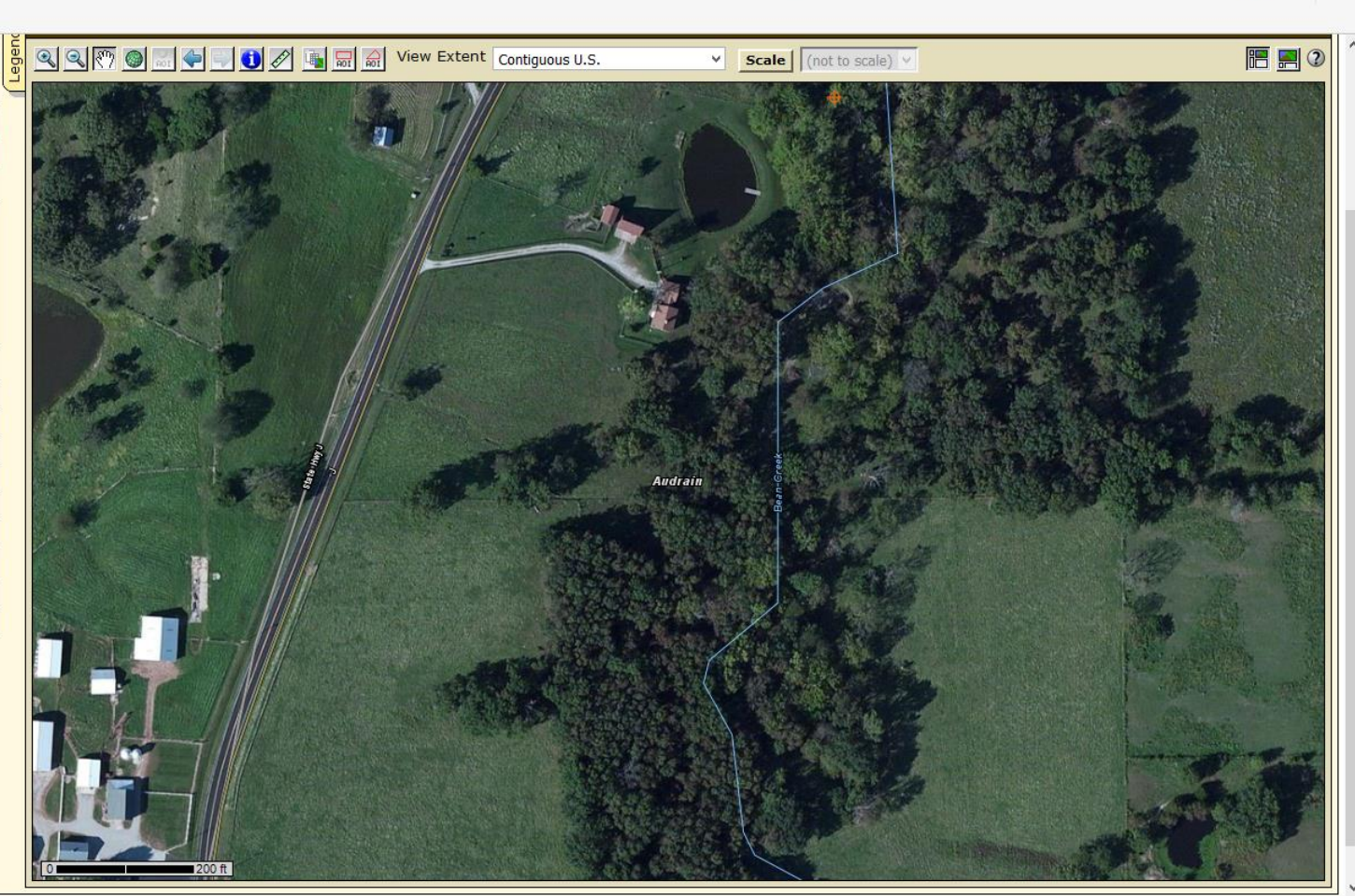
Bureau of Land Management

Department of Defense

Forest Service

National Park Service

Hydrologic Unit





Area of Interest (AOI) **Soil Map** Soil Data Explorer Download Soils Data Shopping Cart (Free)

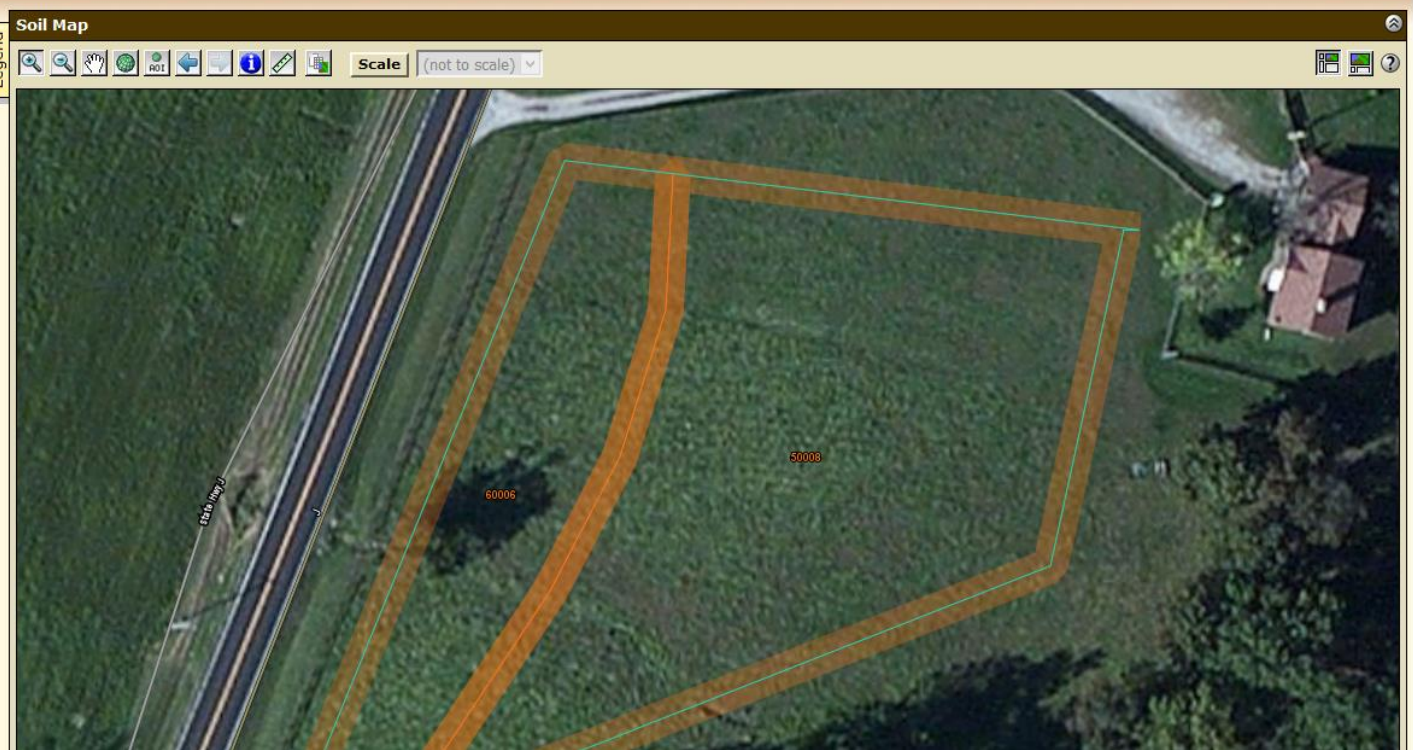
Printable Version Add to Shopping Cart

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%



The screenshot shows a web browser displaying the MRCC website. The URL is mrcc.isws.illinois.edu/mw_climate/climateSummaries/climSummOut_grow.jsp?stnId=USC00234544. The page features a navigation menu with items: About Us, Data & Services, Midwest Climate, Resources, Research, Multimedia, and Home. The main content area is titled "MIDWEST CLIMATE: CLIMATE SUMMARIES" and includes a "Change Selections" button. Below this is a section for "Growing Season Summary for Station USC00234544 - KIRKSVILLE, MO". A table provides monthly and annual climate data for various GDD and MGDD metrics.

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.

Growing Season Summary - Derived from 1981-2010 Averages

Base Temp °F	DATE OF LAST SPRING OCCURRENCE					DATE OF FIRST FALL OCCURANCE				
	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

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

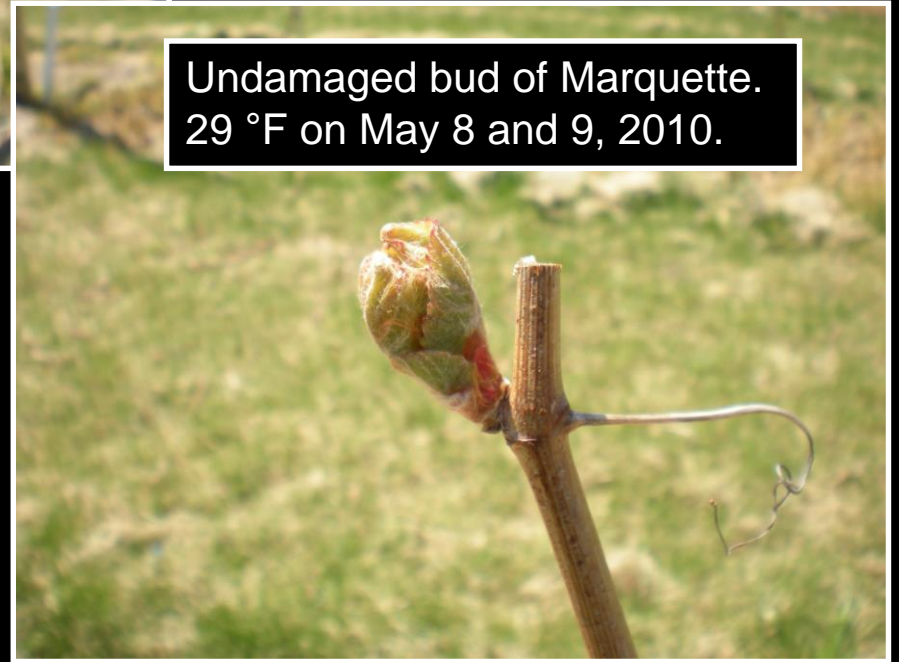
Base Temp °F	Median	Shortest	10%	90%	Longest
36	149	112	129	169	214
32	169	128	149	190	221
28	190	157	169	211	247
24	211	161	189	232	262
20	230	196	209	254	288
16	149	161	227	275	262

Mesoclimate

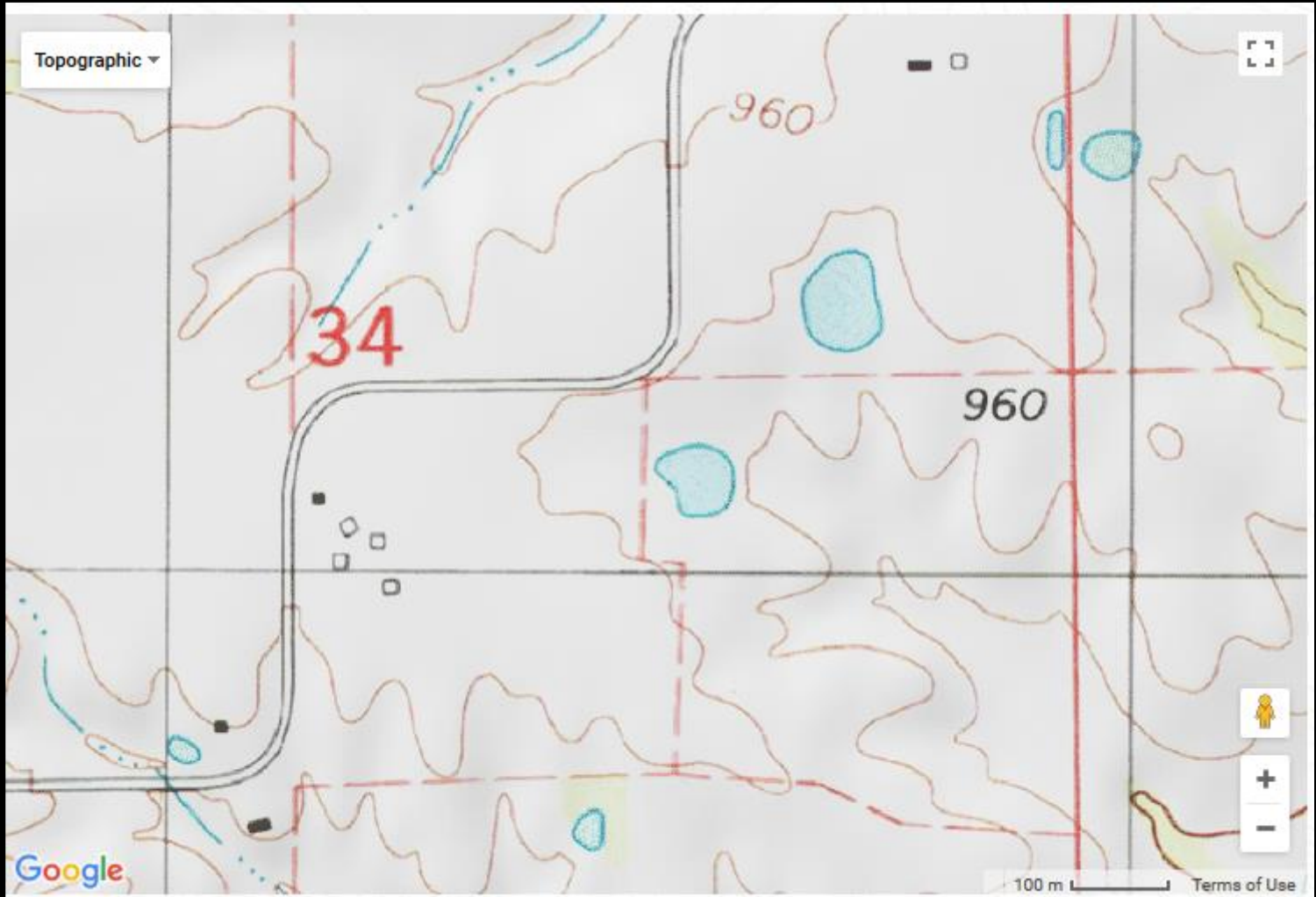
Frost damaged bud of Marquette.
29 °F on May 8 and 9, 2010.





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



Mesoclimate





Web Soil Survey

Home About Soils Help Contact Us


You are here: Web Soil Survey Home

Search


Browse by Subject

- Soils Home
- National Cooperative Soil Survey (NCSS)
- Archived Soil Surveys
- Status Maps
- Official Soil Series Descriptions (OSD)
- Soil Series Extent Mapping Tool
- Geospatial Data Gateway
- eFOTG
- National Soil Characterization Data
- Soil Health
- Soil Geography

The simple yet powerful way to access and use soil data.



Welcome to Web Soil Survey (WSS)



Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

Soil surveys can be used for general farm, local, and wider area planning. Onsite investigation is needed in some cases, such as soil quality assessments and certain conservation and engineering applications. For more detailed information, contact your local [USDA Service Center](#) or your [NRCS State Soil Scientist](#).

Four Basic Steps

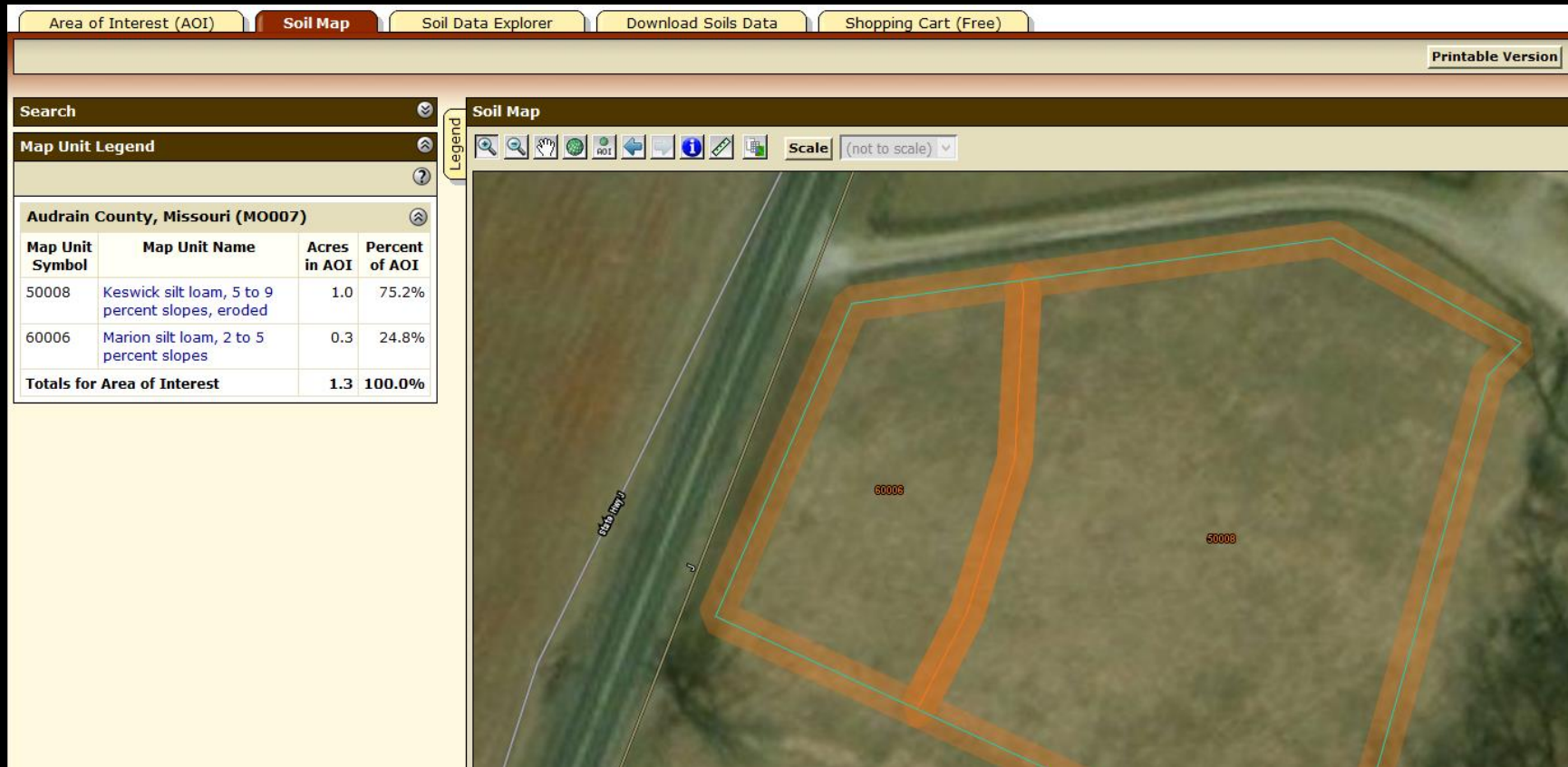
I Want To...

- Start Web Soil Survey (WSS)
- Know the requirements for running Web Soil Survey – will Web Soil Survey work in my web browser?
- Know the Web Soil Survey hours of operation
- Find what areas of the U.S. have soil data
- Find information by topic
- Know how to hyperlink from other documents to Web Soil Survey
- Know the SSURGO data structure

Announcements/Events

- Web Soil Survey 3.2 has been released! View description of new features and fixes.
- Web Soil Survey Release History
-  Sign up for e-mail updates via GovDelivery

Mesoclimate - Soil



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

Mesoclimate - Soil

The screenshot shows the UC Davis California Soil Resource Lab website. The header includes the lab's name and a search bar. A navigation menu contains links for HOME, SOILWEB APPS, PEOPLE, PROJECTS, SOFTWARE, LINKS, and BLOG. The main content area is titled "SoilWeb Apps" and contains a paragraph: "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:". Below this are two columns. The left column is titled "SoilWeb" and describes an interactive Google map interface. The right column is titled "SoilWeb Earth" and describes a 3-D display interface. Each column includes a small screenshot of the respective application. The "SoilWeb" screenshot shows a map of a city area with yellow soil survey boundaries and a sidebar with soil unit composition data. The "SoilWeb Earth" screenshot shows a 3-D topographic map with a pop-up window displaying soil data for a specific location.

UC DAVIS CALIFORNIA SOIL RESOURCE LAB

HOME SOILWEB APPS PEOPLE PROJECTS SOFTWARE LINKS BLOG

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.

UC DAVIS

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

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						LIMESTONE SUGGESTIONS	
	Pounds per acre*							
	N	P ₂ O ₅	K ₂ O	Zn	S	B	Effective neutralizing material (ENM)	
4 Grapes (New-planting)	40	50	0	5	0	0	1810	
10 Grapes (Established)	20	40	0	0	0	0	lbs/a	
							0	

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

Comments:

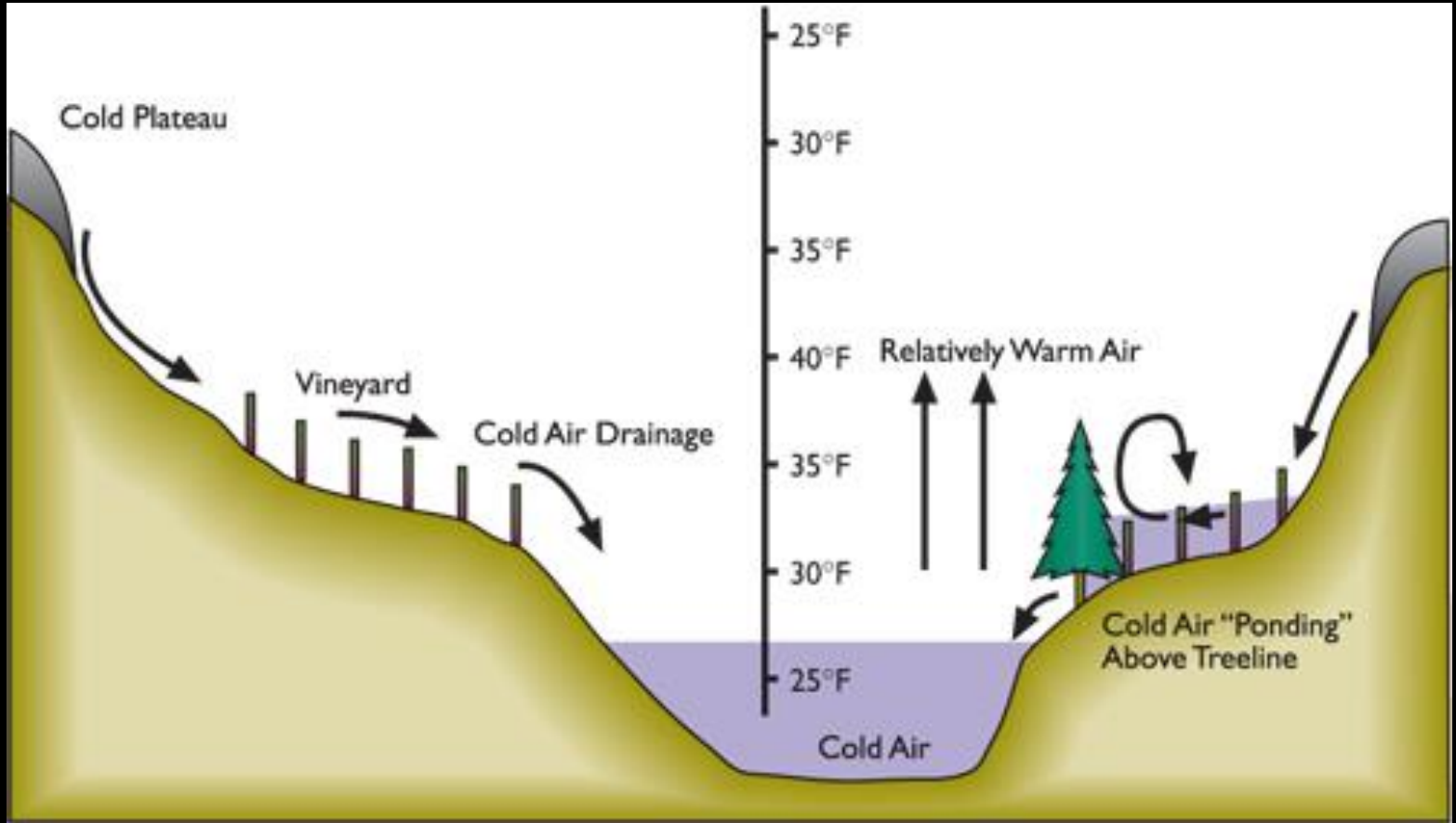


Ideal pH for clay/loam soils

Ideal pH for sandy soils

Results of soil test

Mesoclimate - Slope



Mesoclimate - Slope



Mesoclimate - Slope

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

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&tbn=isch&sa=X&ved=0ahUKEwi3mM7viLLWAhVM42MKHcnVAOoQ_AUICigB&biw=1600&bih=767#imgc=HY3RWLsmNzxBzM



Mesoclimate - Vegetation

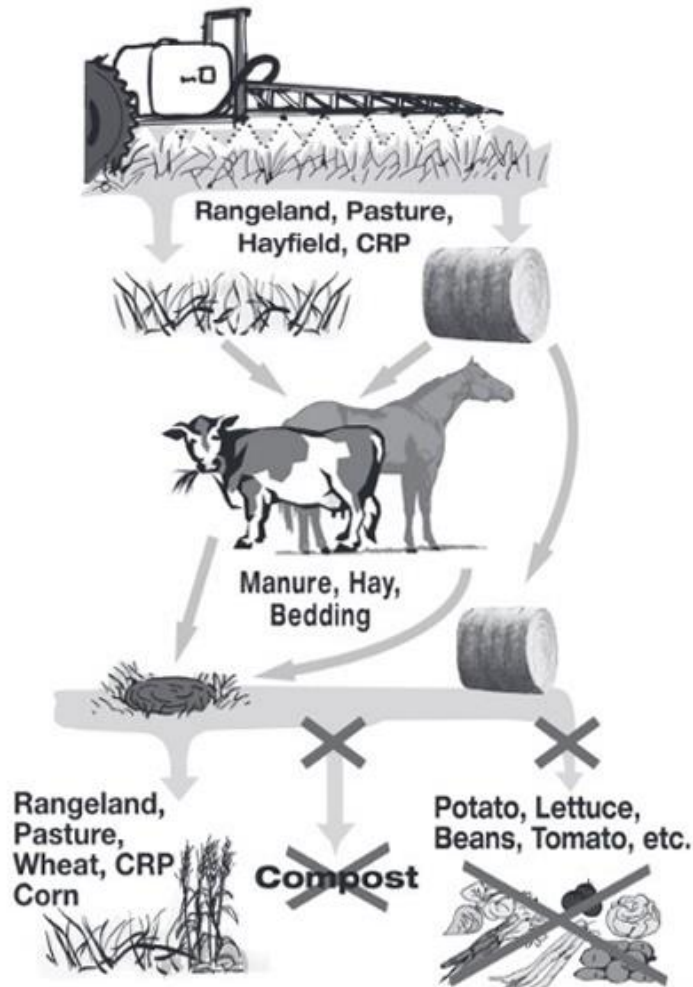
- Pasture Sites
 - Perennial plants
 - Herbicide history
 - Grazon Herbicide
 - Aminopyralid, clopyralid, picloram, triclopyr
 - Bioassay –green bean



IMPORTANT USE PRECAUTIONS AND RESTRICTIONS TO PREVENT INJURY TO DESIRABLE PLANTS

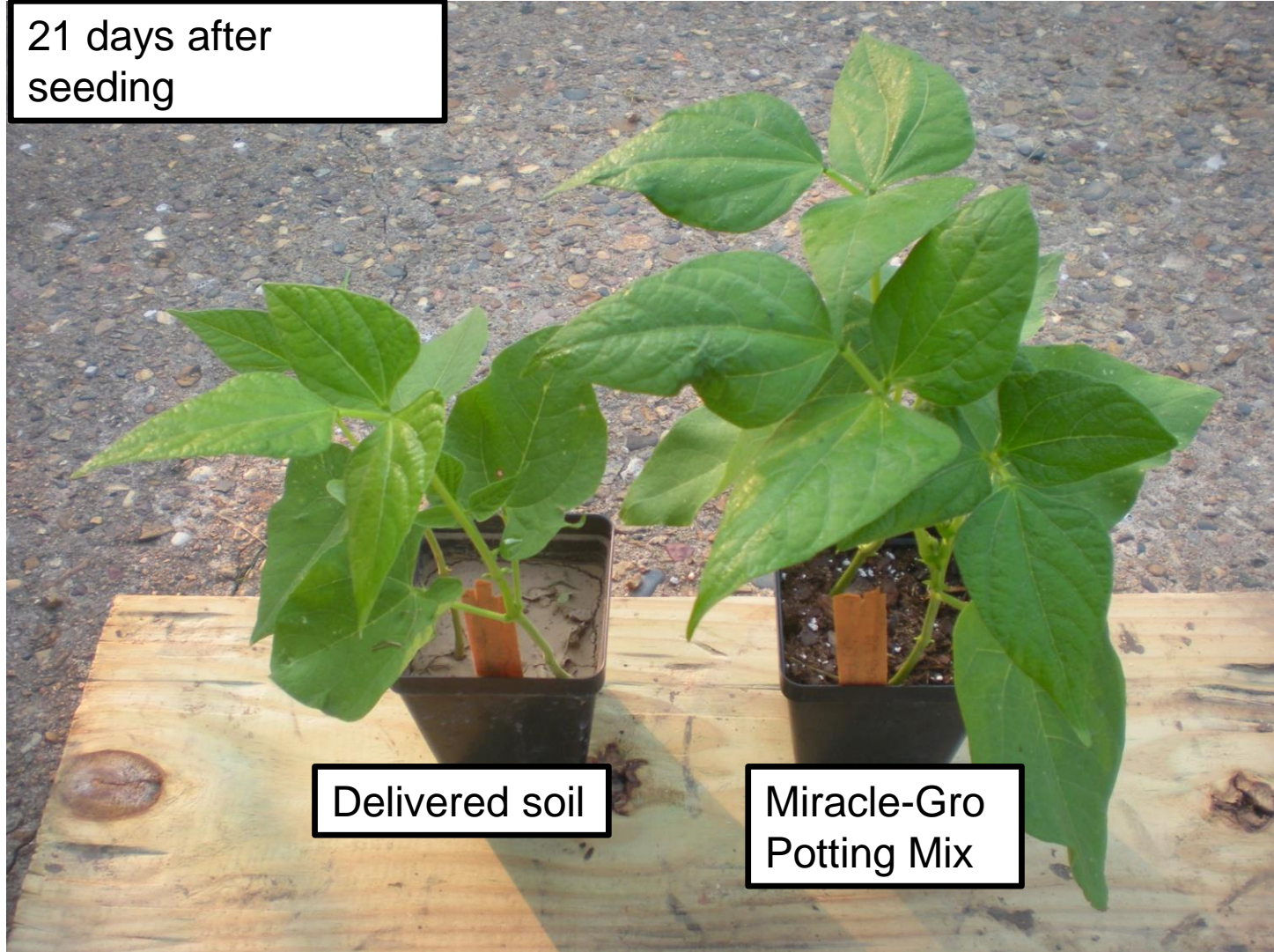
- Carefully read the section "*Restrictions in Hay or Manure Use*."
- It is mandatory to follow the "*Use Precautions and Restrictions*" section of this label.
- Manure and urine from animals consuming grass or hay treated with this product may contain enough aminopyralid to cause injury to sensitive 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.

Forage and Manure Management



©Copyright 2011 Dow AgroSciences LLC

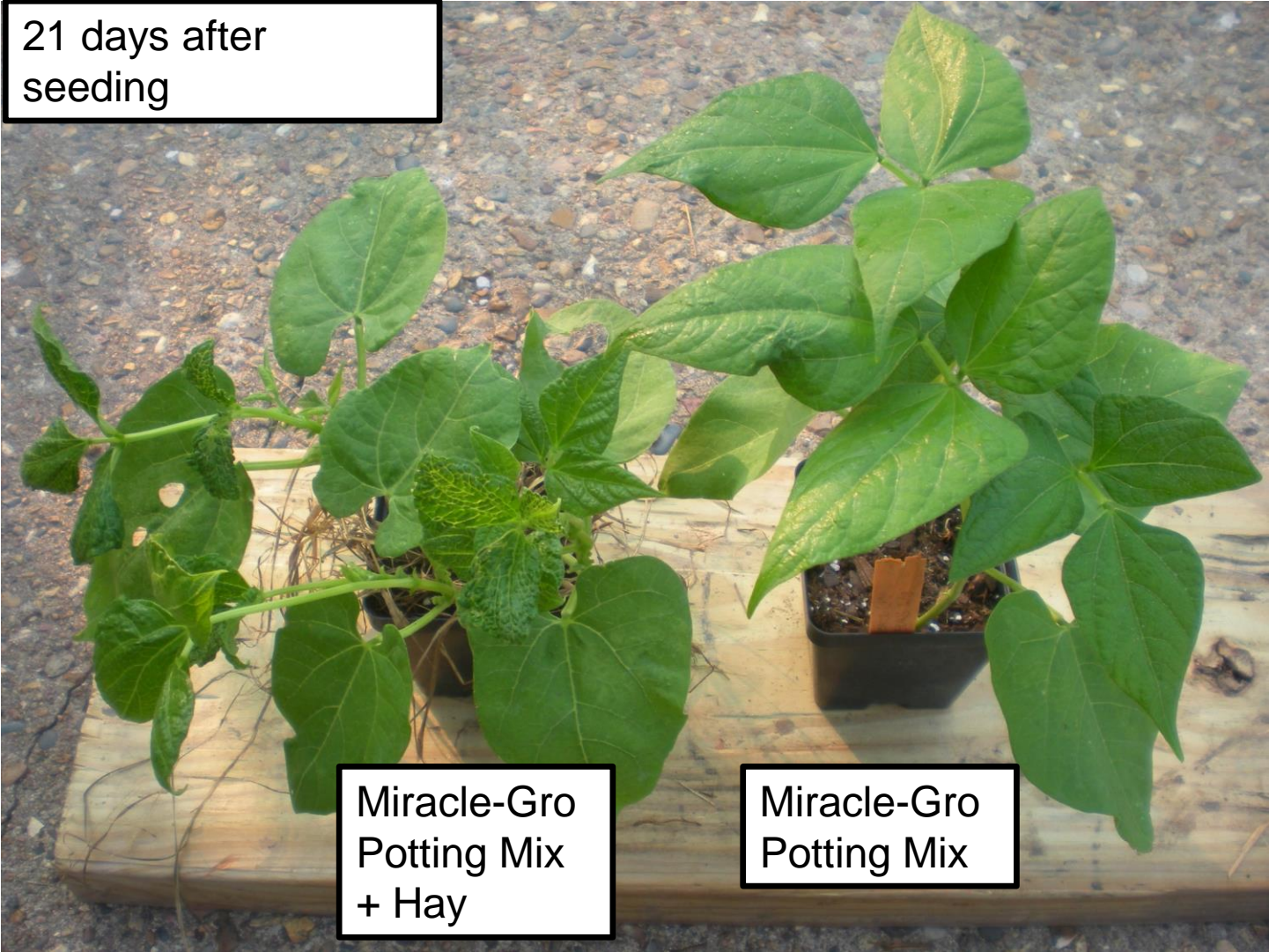
21 days after
seeding



Delivered soil

Miracle-Gro
Potting Mix

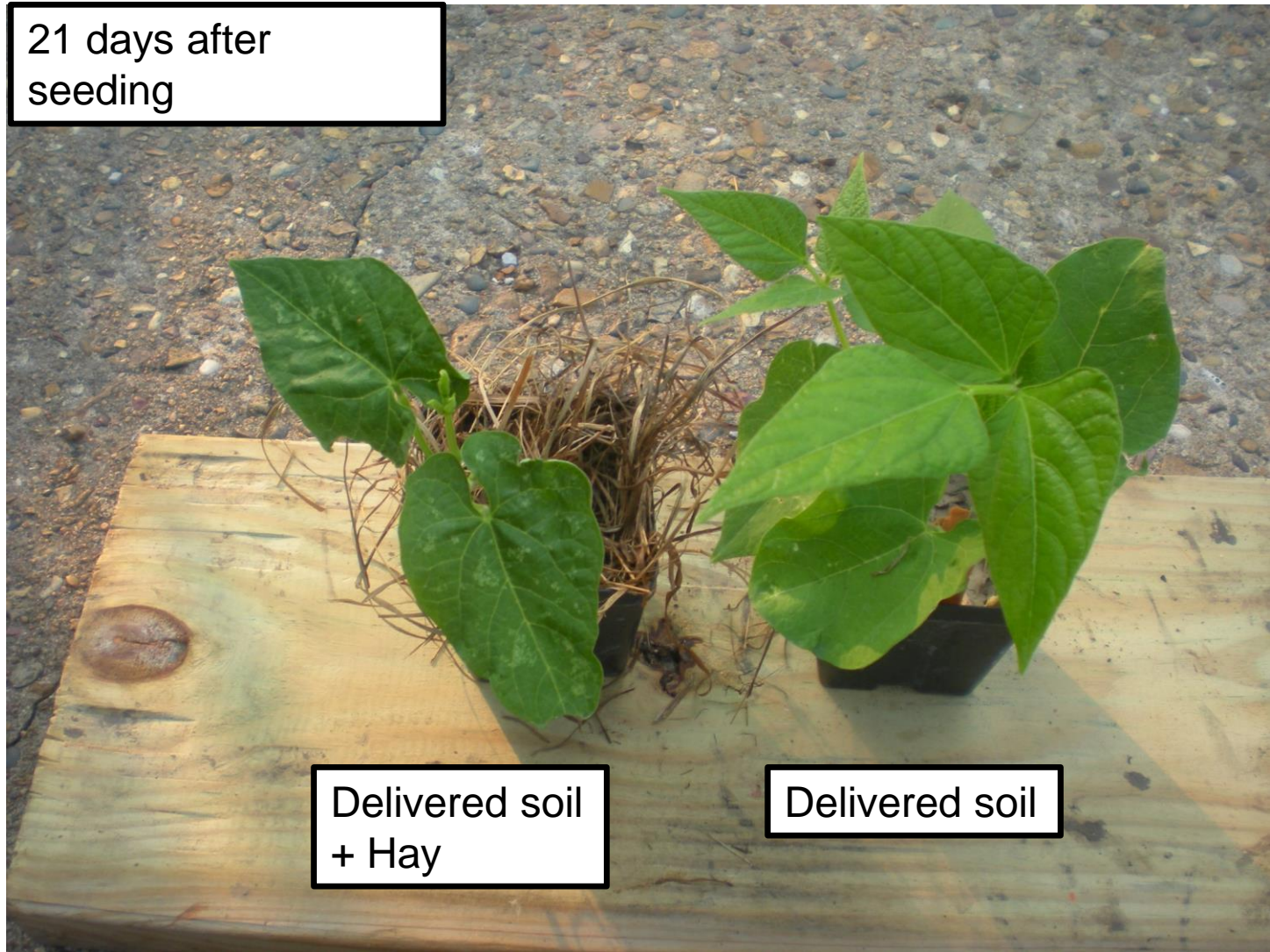
21 days after
seeding



Miracle-Gro
Potting Mix
+ Hay

Miracle-Gro
Potting Mix

21 days after
seeding



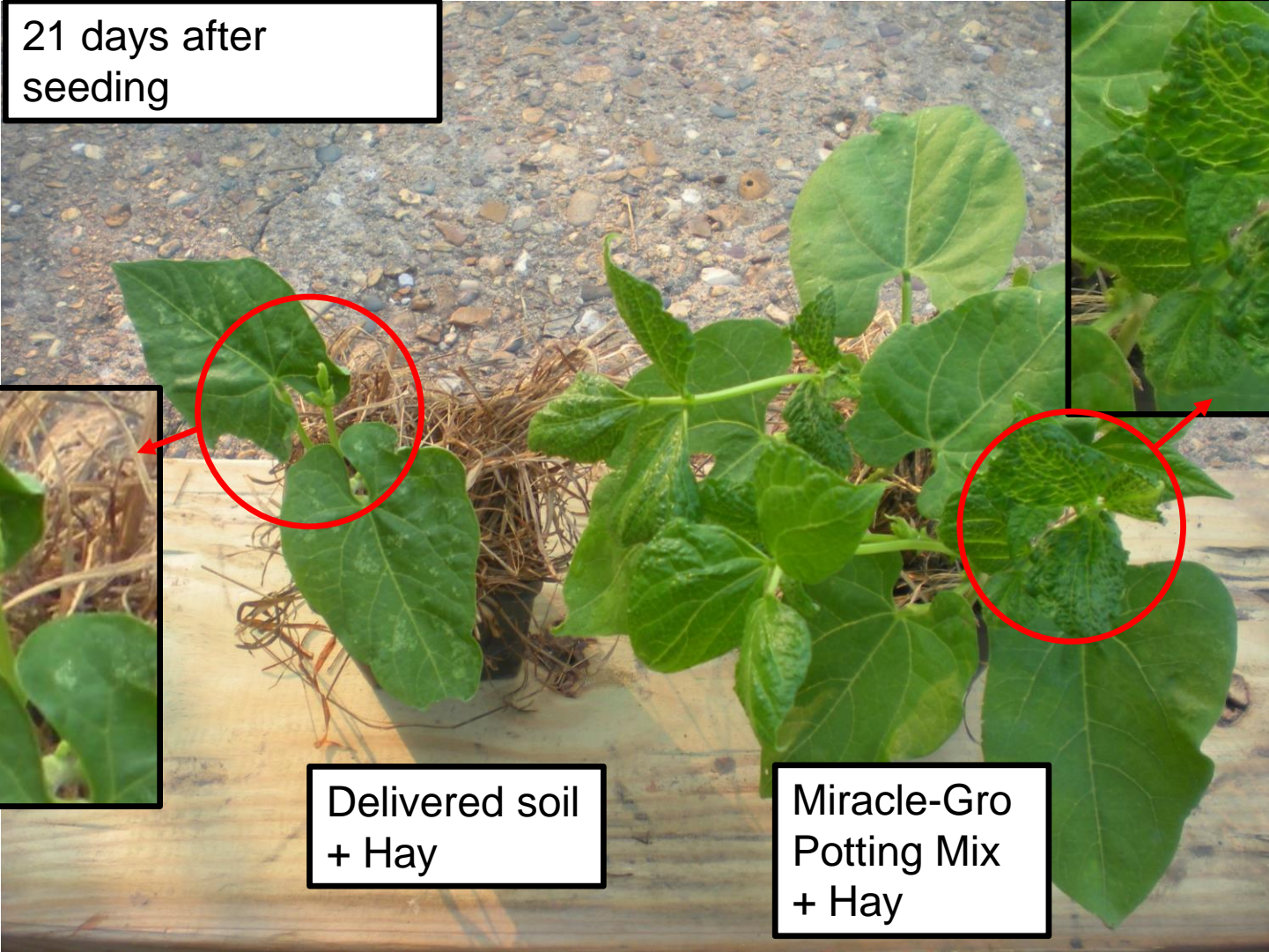
Delivered soil
+ Hay

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

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

Also see [Contaminated Compost](#) by Debbi Kelly



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)		
Sumount (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.

Mesoclimates – Cropping History

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



IPM & Vineyard Site Selection

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



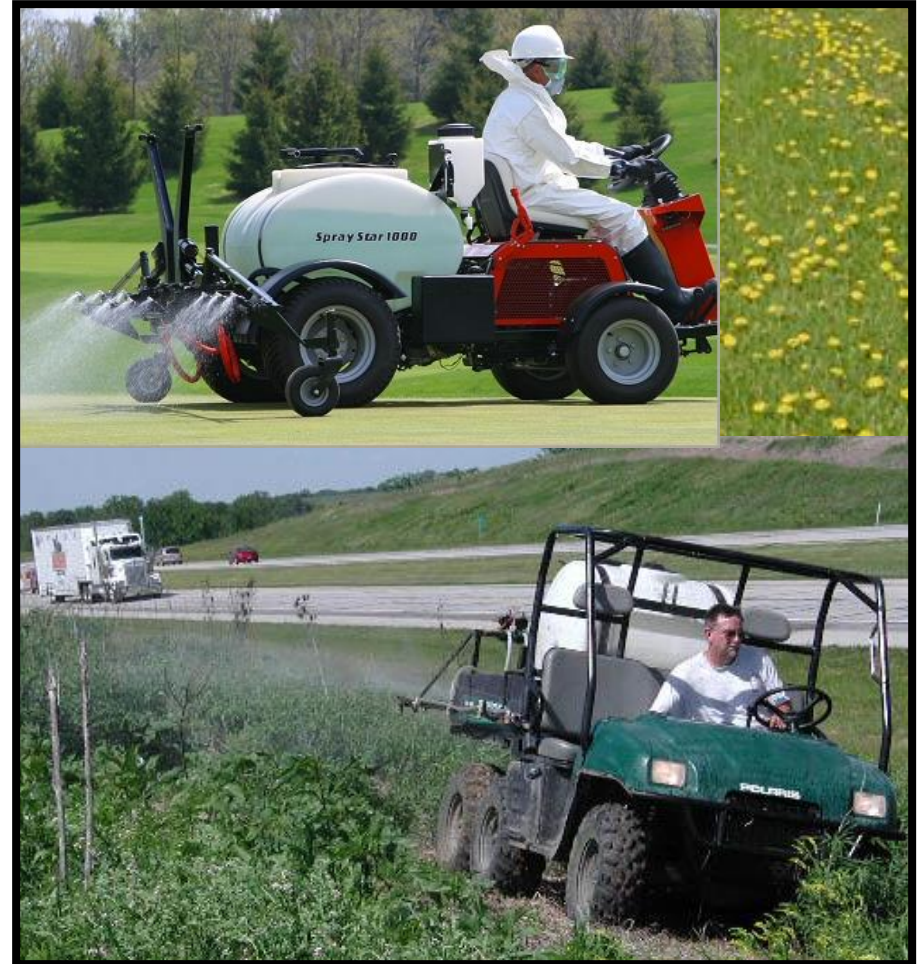
IPM & Vineyard Site Selection

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



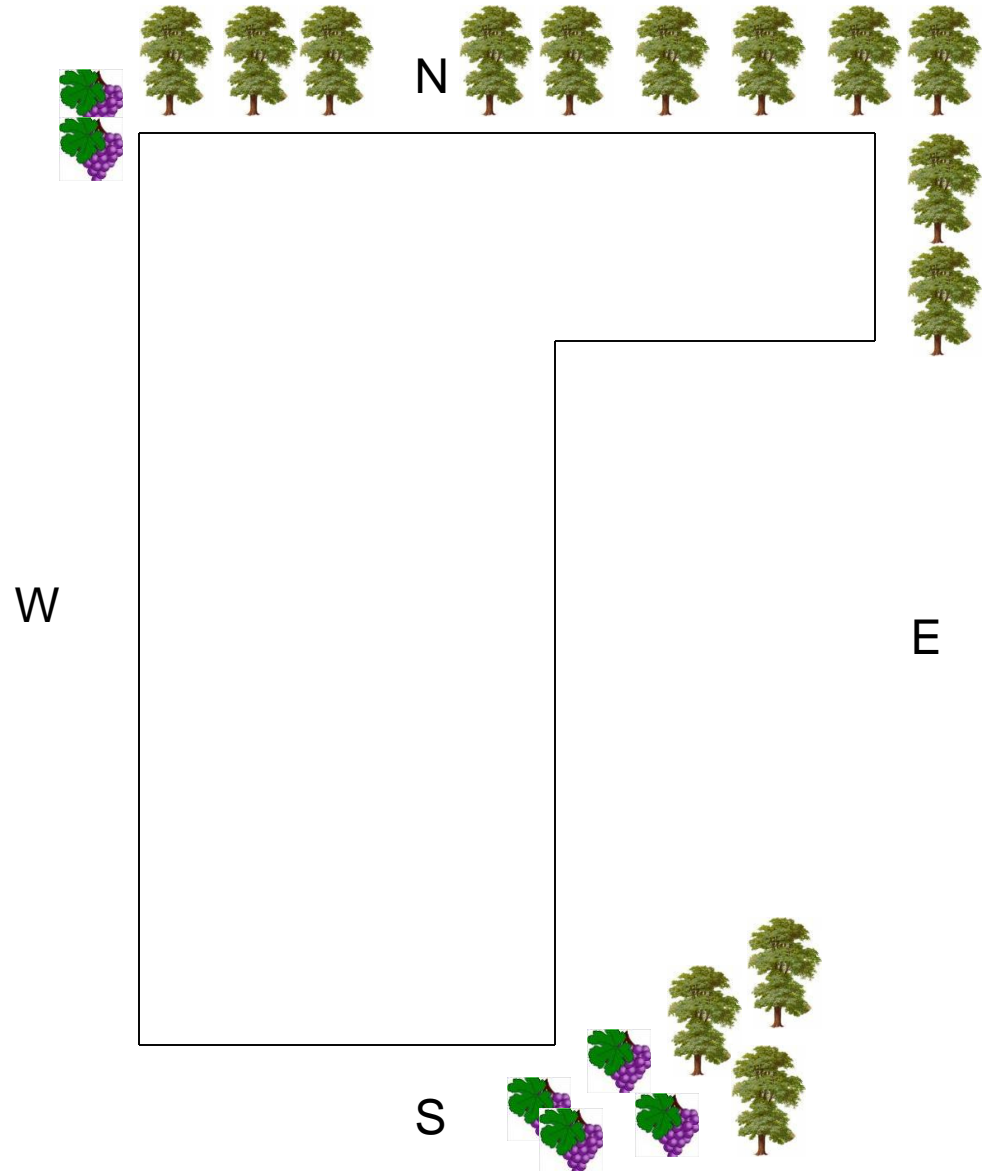
Other Herbicide Off-Target Sources

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



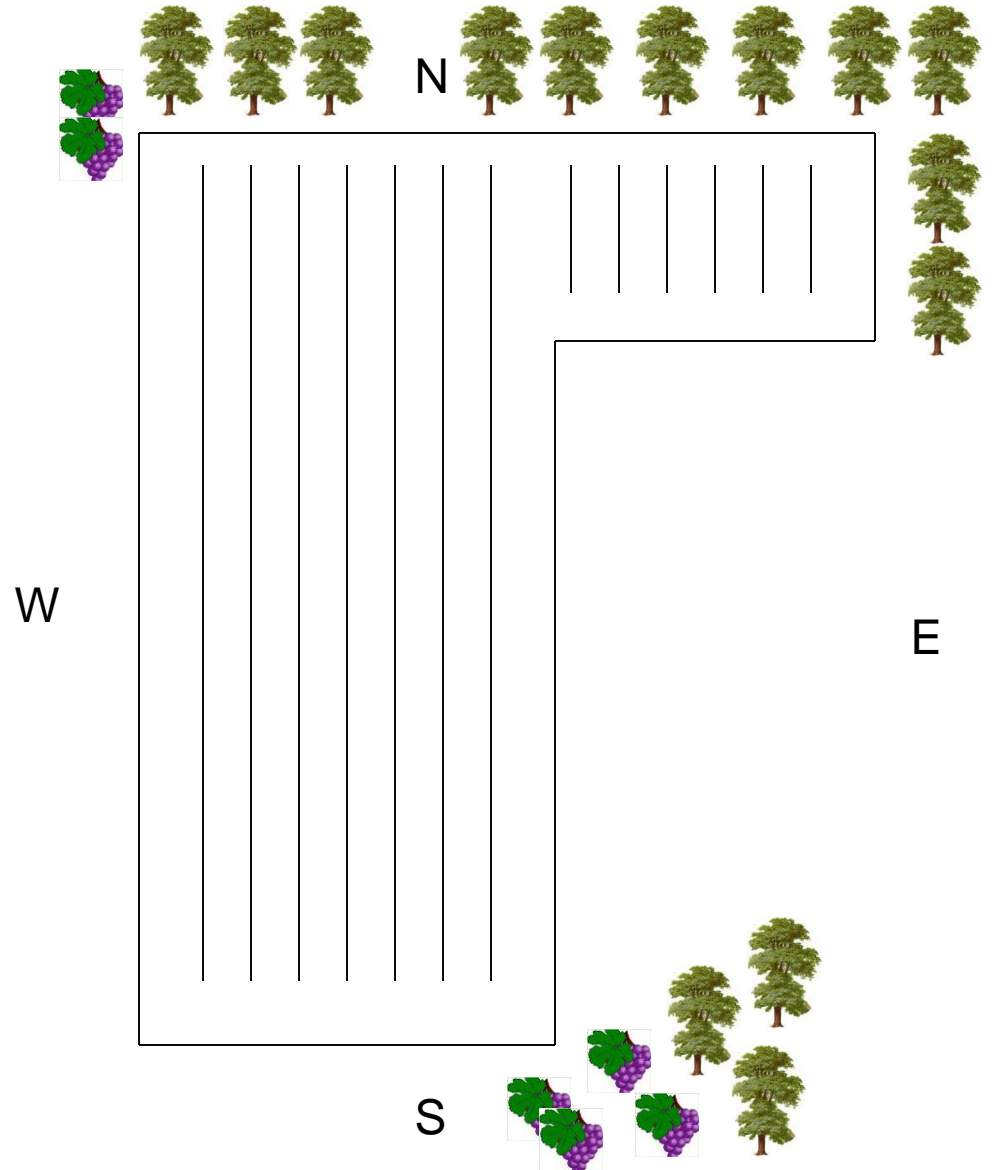
IPM & Vineyard Site Selection

- Map your site and surroundings



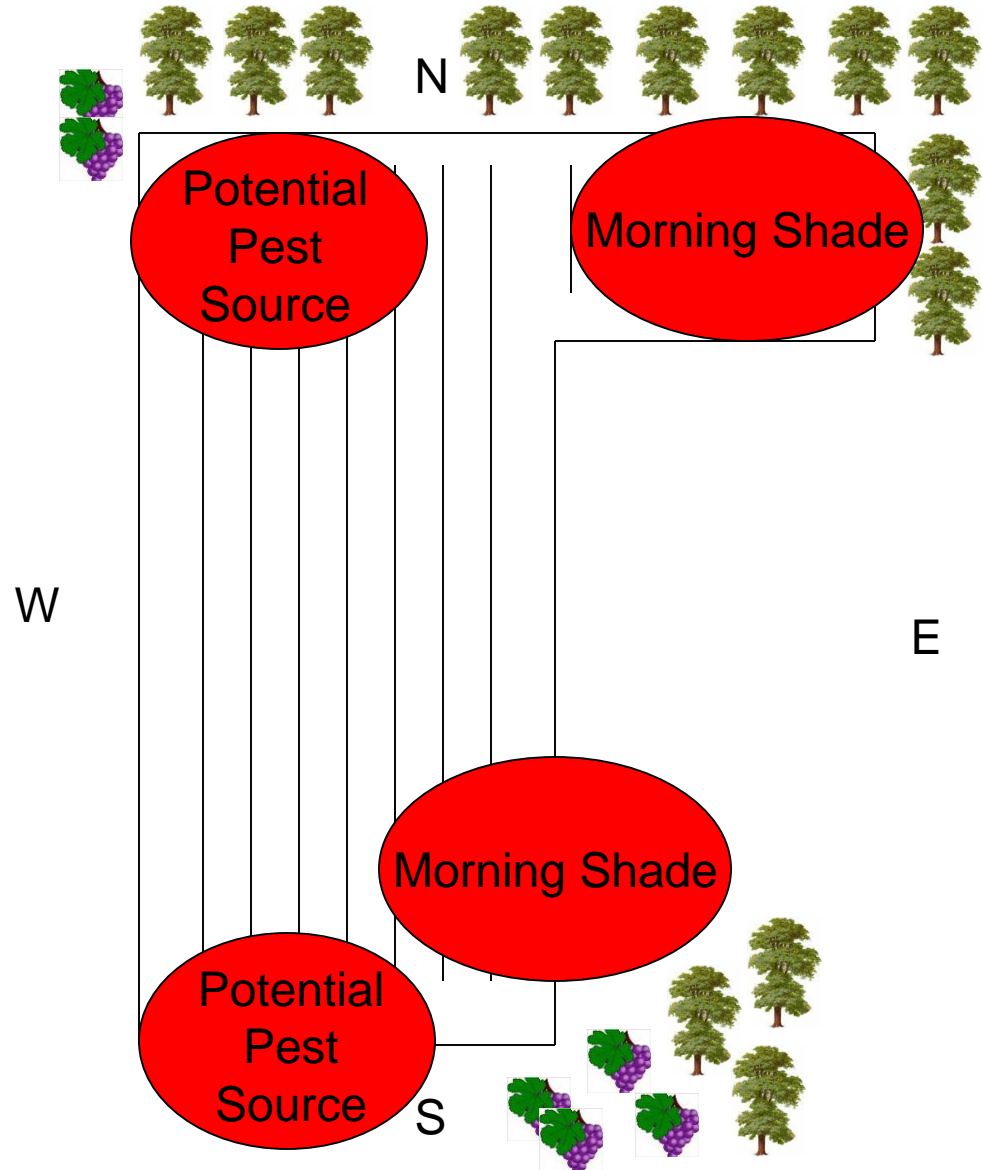
IPM & Vineyard Site Selection

- Map your site and surroundings
- Lay out rows



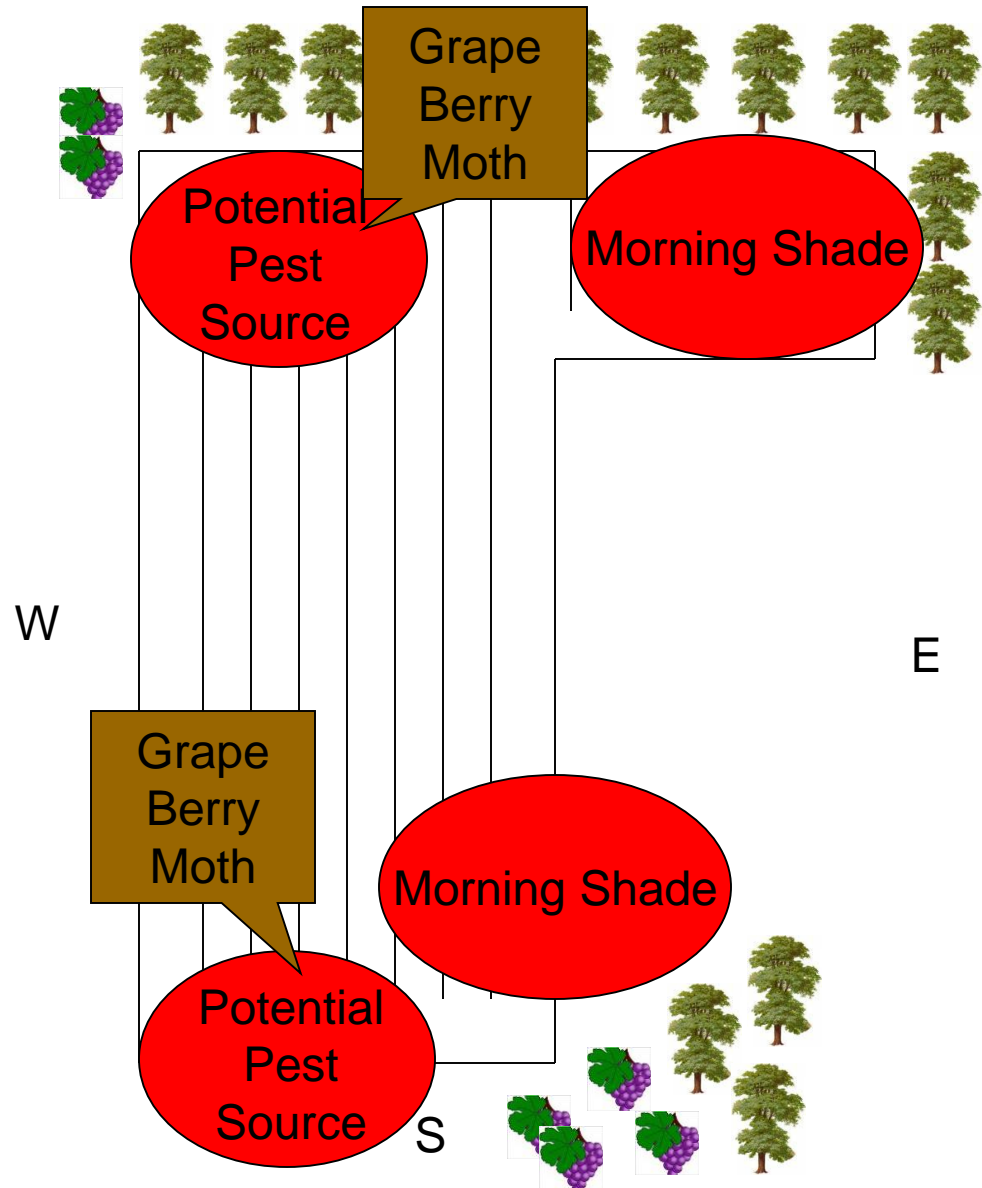
IPM & Vineyard Site Selection

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



IPM & Vineyard Site Selection

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



- 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