Vineyard Water Management After A Wet Winter

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2023 Winter Storm and Flooding

Reuters

Latest 'atmospheric river' storm renews flood threat in California

23 hours ago

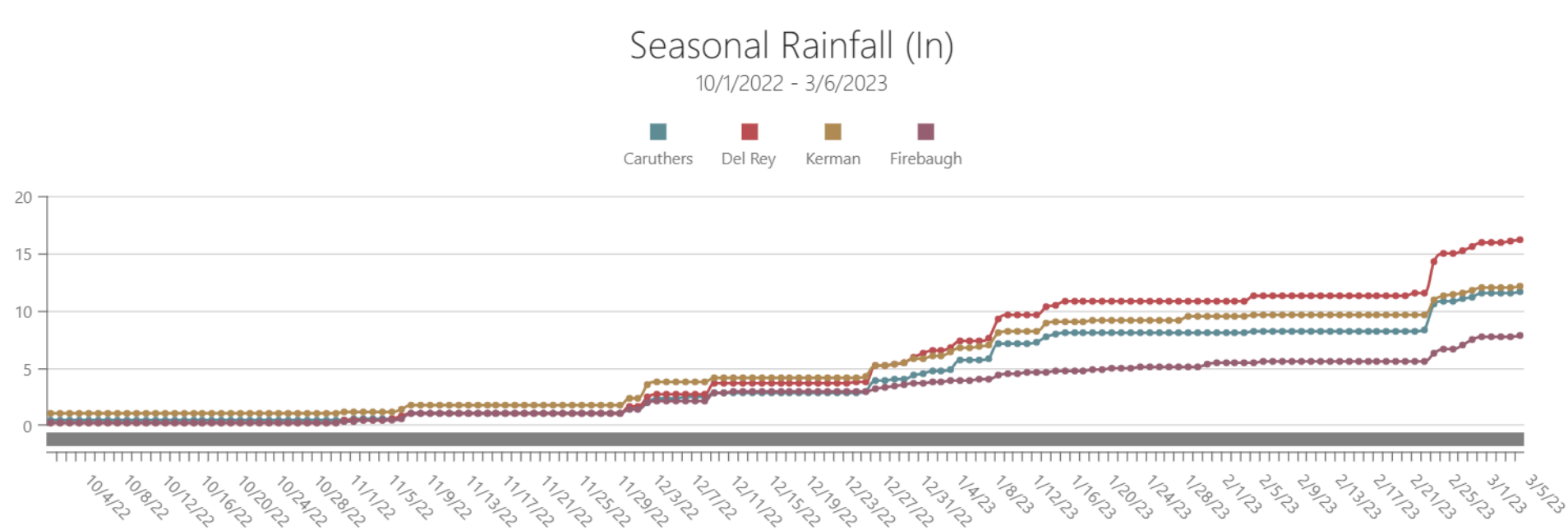
Los Angeles Times

Winter storm slams Northern California, bringing flood fears

11 hours ago

Month	Fresno (CIMIS #80) 2022-2023	Five Points (CIMIS #2) 2022-2023	Fresno historical normal
Oct.	0.02	0.00	0.63
Nov.	0.75	0.46	1.07
Dec.	5.37	2.70	1.77
Jan.	5.10	3.12	2.19
Feb.	4.57	2.25	2.03
March.	0.71	0.22	2.03
Total	16.52	8.75	9.72

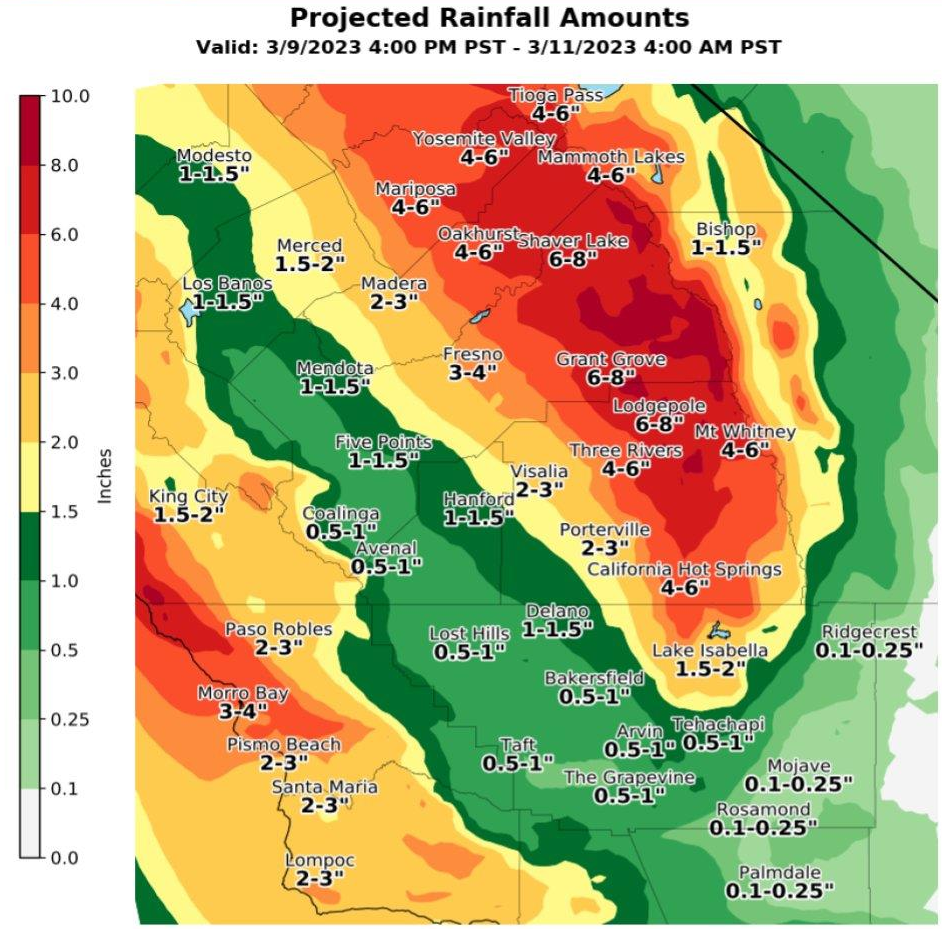
Fresno: 1878-present

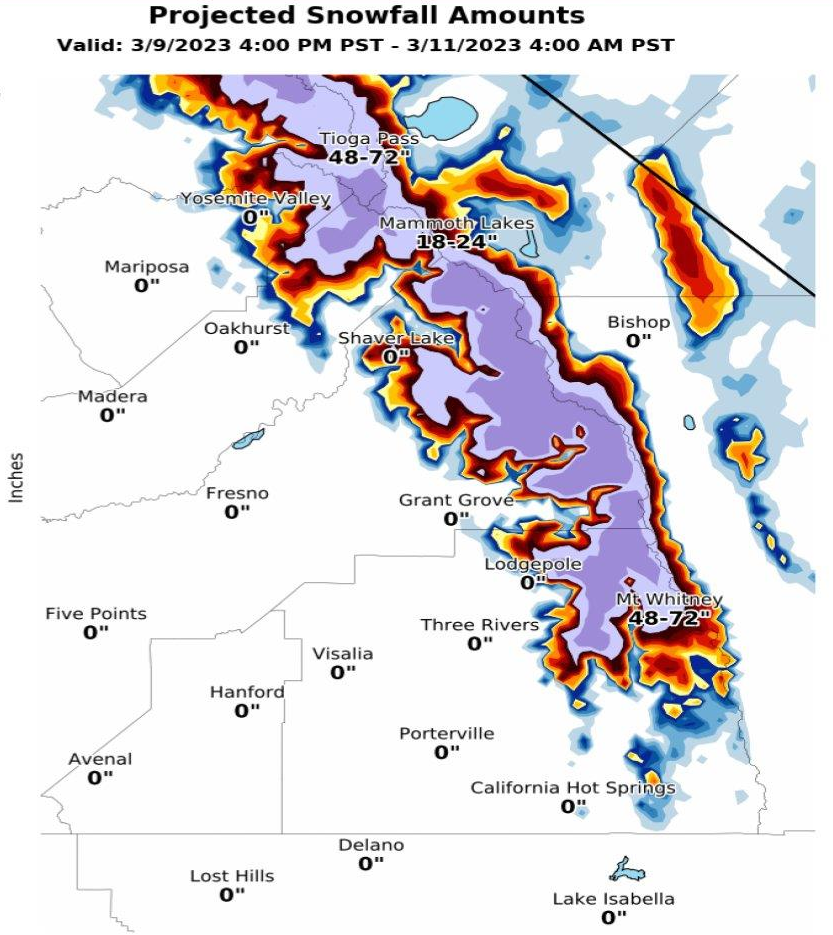

Seasonal Rainfall (In)
10/1/2022 - 3/6/2023
Caruthers
Del Rey
Kerman
Firebaugh
20
15
10
5
0
10/4/22
10/8/22
10/12/22
10/16/22
10/20/22
10/24/22
10/28/22
11/1/22
11/5/22
11/9/22
11/13/22
11/17/22
11/21/22
11/25/22
11/29/22
12/3/22
12/7/22
12/11/22
12/15/22
12/19/22
12/23/22
12/27/22
12/31/22
1/4/23
1/8/23
1/12/23
1/16/23
1/20/23
1/24/23
1/28/23
2/1/23
2/5/23
2/9/23
2/13/23
2/17/23
2/21/23
2/25/23
3/1/23
3/5/23

More Rain Coming

Projected Precip Thursday Evening Through Friday Night

Weather Forecast Office
Hanford, CA
Wednesday, March 8





Vineyard Water Management?

Vineyard Irrigation and Sustainability – Dr. Larry Williams, UC Davis

- Maintain productivity over time
- Maximize fruit quality
- Increase vineyard ***water use efficiency*** or decrease ***water footprint*** (*in general, if the vineyard is irrigated any reduction in applied water will increase WUE, decrease water footprint*).
- Minimize/maximize soil water depletion (function of soil type and rooting depth, cover crop management)
- Some of the above factors will be a function of location in California and price of grapes

Why Vineyard Water Matters?

- Don’t start water when you don’t have to
  - ✓ Pumping cost
  - ✓ Water saving
  - ✓ Canopy management
  - ✓ Pest and disease management
  - ✓ Frost management
- Unless it is for ground water recharge

Mature vineyard with Drip Irrigation

Vineyard (ET)=24 in or 2.0 ft. of water per season

Area=40 acres

Irrigation method: Drip Irrig (25 psi) @ pump outlet

Water lift: 100 ft. (from aquifer level to ground)

TDHDI: 100 ft. + (25 psi × 2.31 ft/psi)=158 ft.

Total ac-ftDI=2.0/**0.9**=2.2 ac-ft

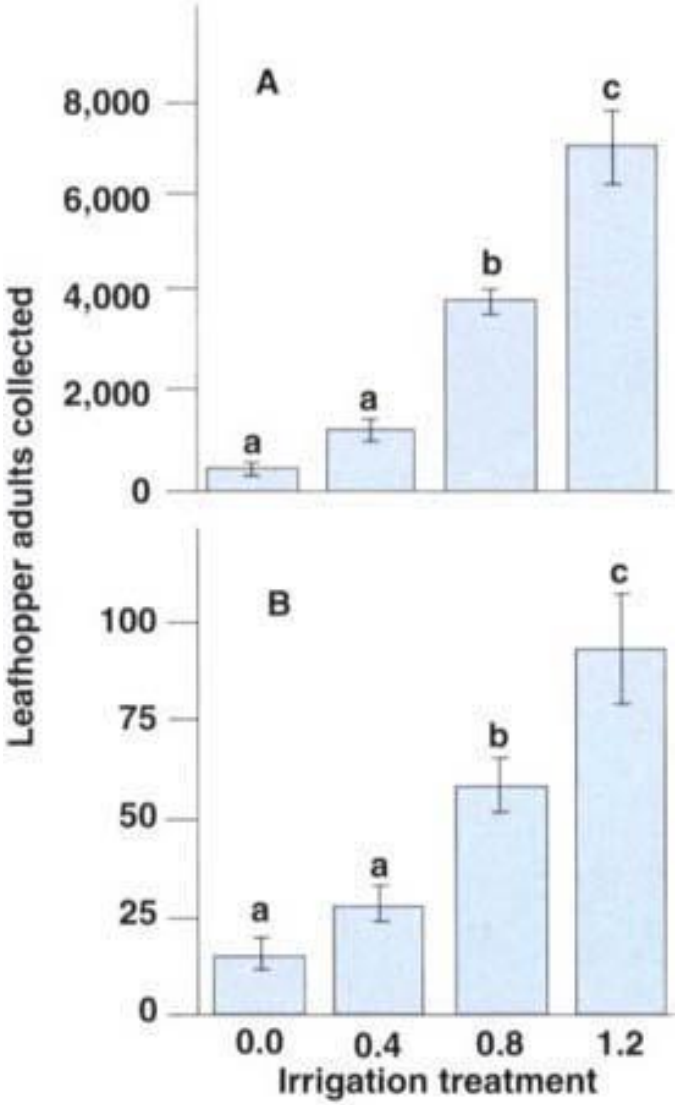
Diesel=0.1 gal/ac-ft per foot of lift

Average price for diesel for Ag. = $2.5 per gallon

Volume of Diesel for drip irrigation = 40 ac × 2.2 ac-ft × 158 ft × 0.1 gal/ac-ft = **1,390 gal**

Cost for Drip Irrigation: 1,390 gal × $2.5 per gallon = **$3,476**

Leafhopper prefers vines with greater amounts of irrigation (Daane et al. 1995)

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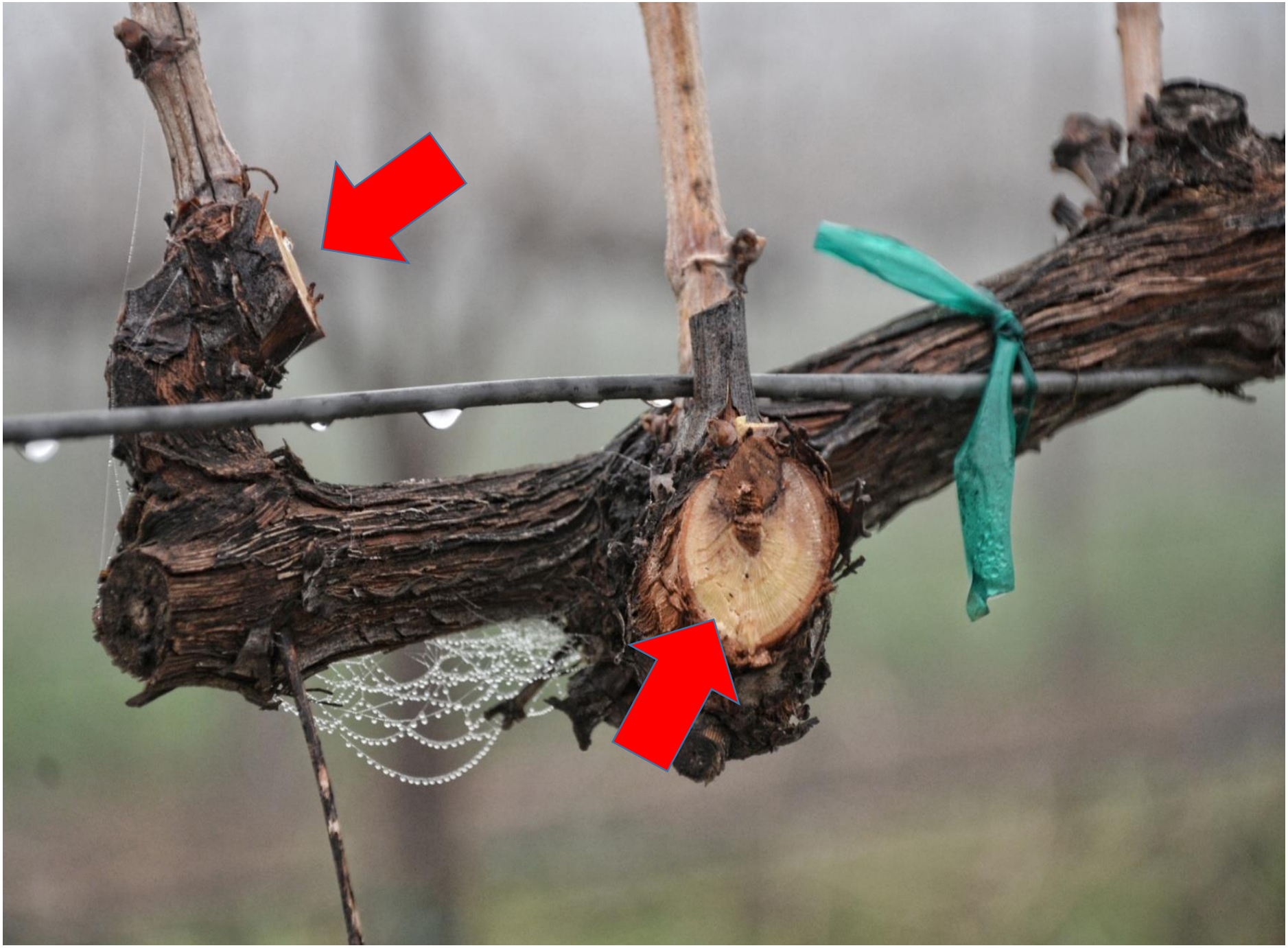


Frost Management

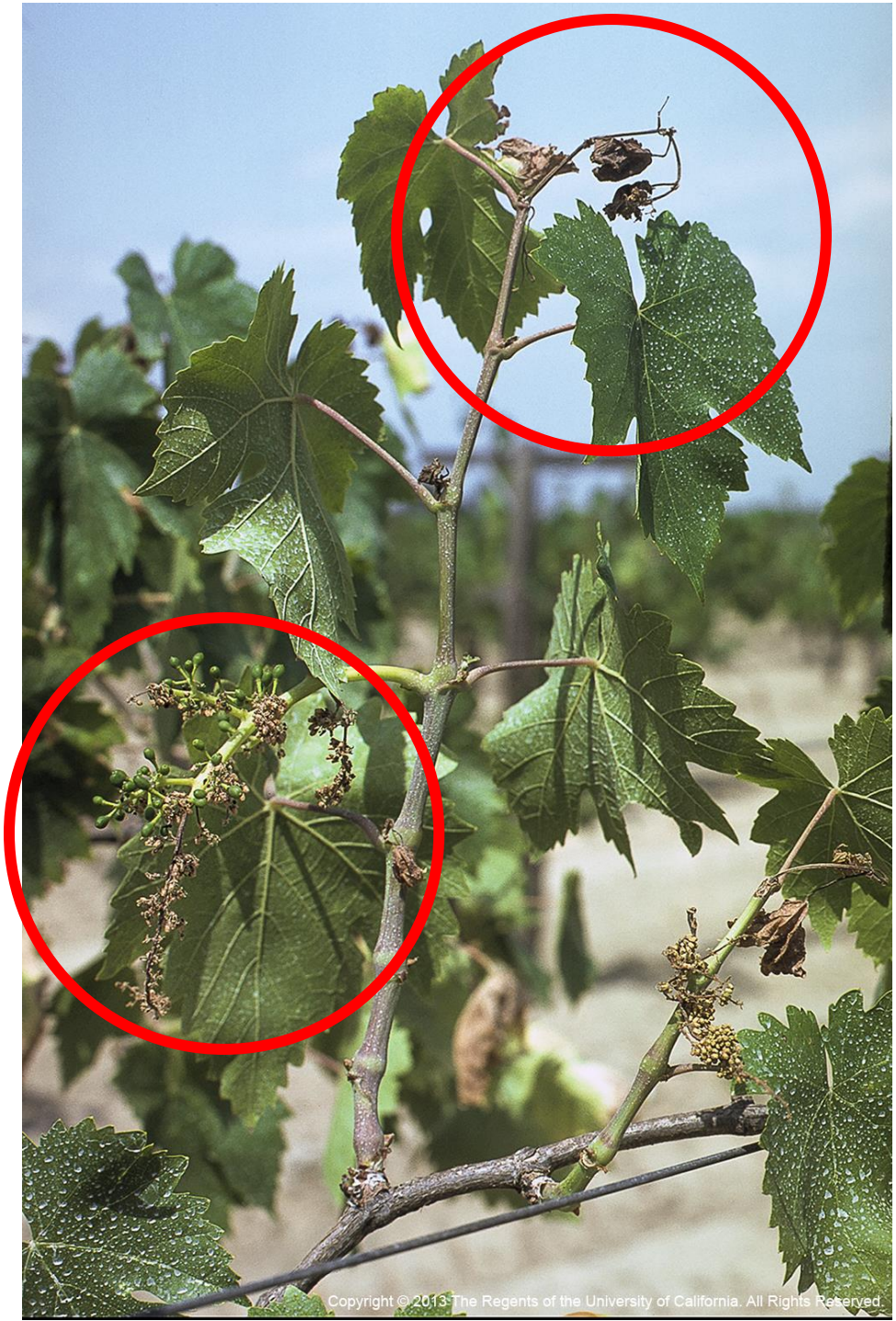
- BB is beginning of frost season
- Cover crops: mow ‘em or kill ‘em
- Turn the water on and don’t disc: clean, moist, and packed soil is warmer

When to Start?

- **Visual assessment**
- **Soil moisture**: measuring the depletion of water in the soil profile to a pre-determined value with a neutron probe (or other such technique)
- **Soil water budgeting**: i.e. calculating vineyard water use and subtracting that from the amount of water in the profile
- **Plant water stress:** leaf or stem water potential

Visual Assessment

- Bud break
- Shoot tip
- Leaf
- Tendril
- Inflorescence/berry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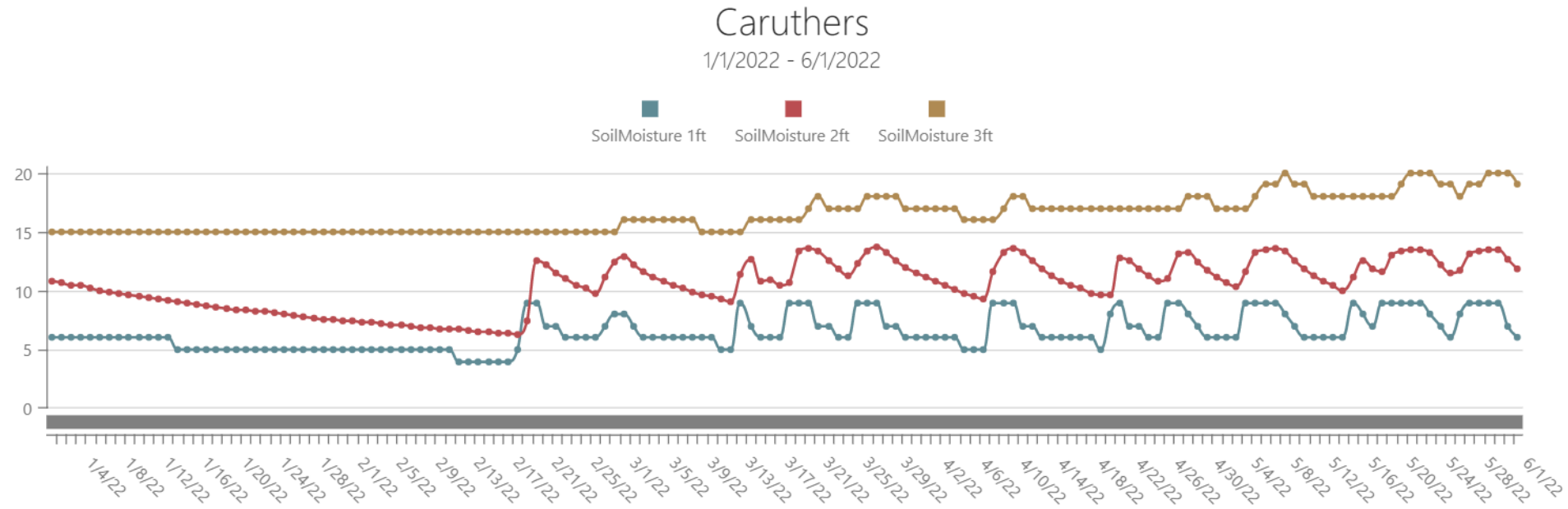
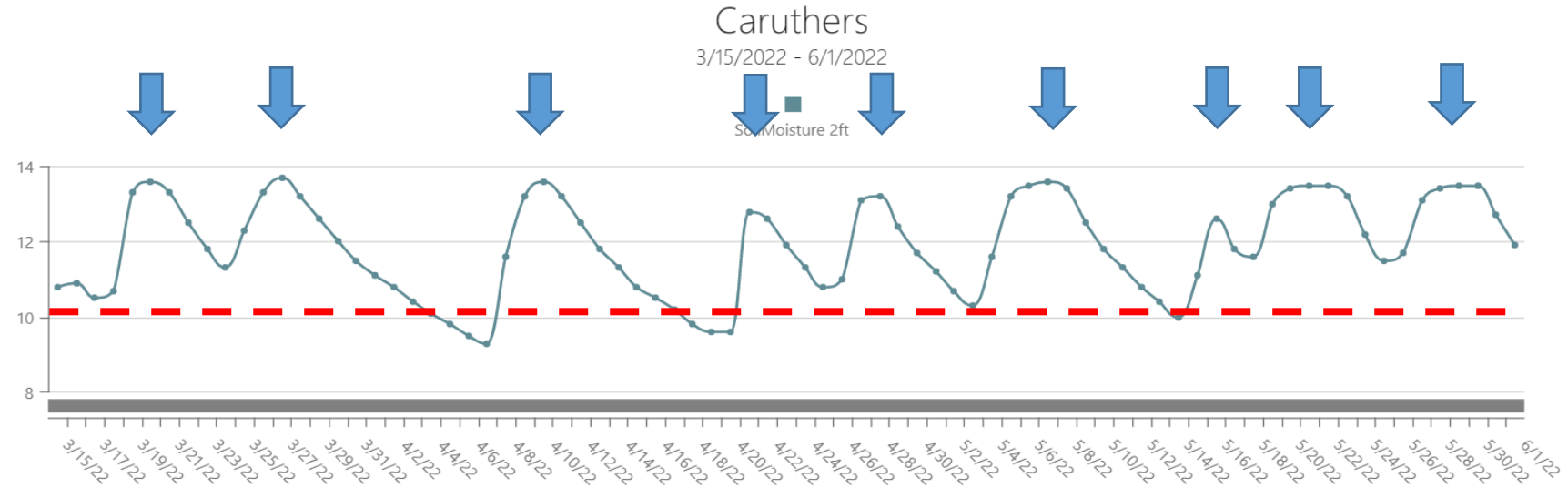
Soil Moisture

- Tensiometer - measures the attraction of soil to its water. Soil-water suction or tension is a measure of the *soil's matric potential* (centibar).
- Gravimetric (%) – taking a known volume of soil and weighing it first and then taking its dry weight.
- Neutron probe, capacitance sensors, TDR – are used to measure soil volumetric water content (%).

Soil Moisture

Trigger Water at Pre-Determined Value

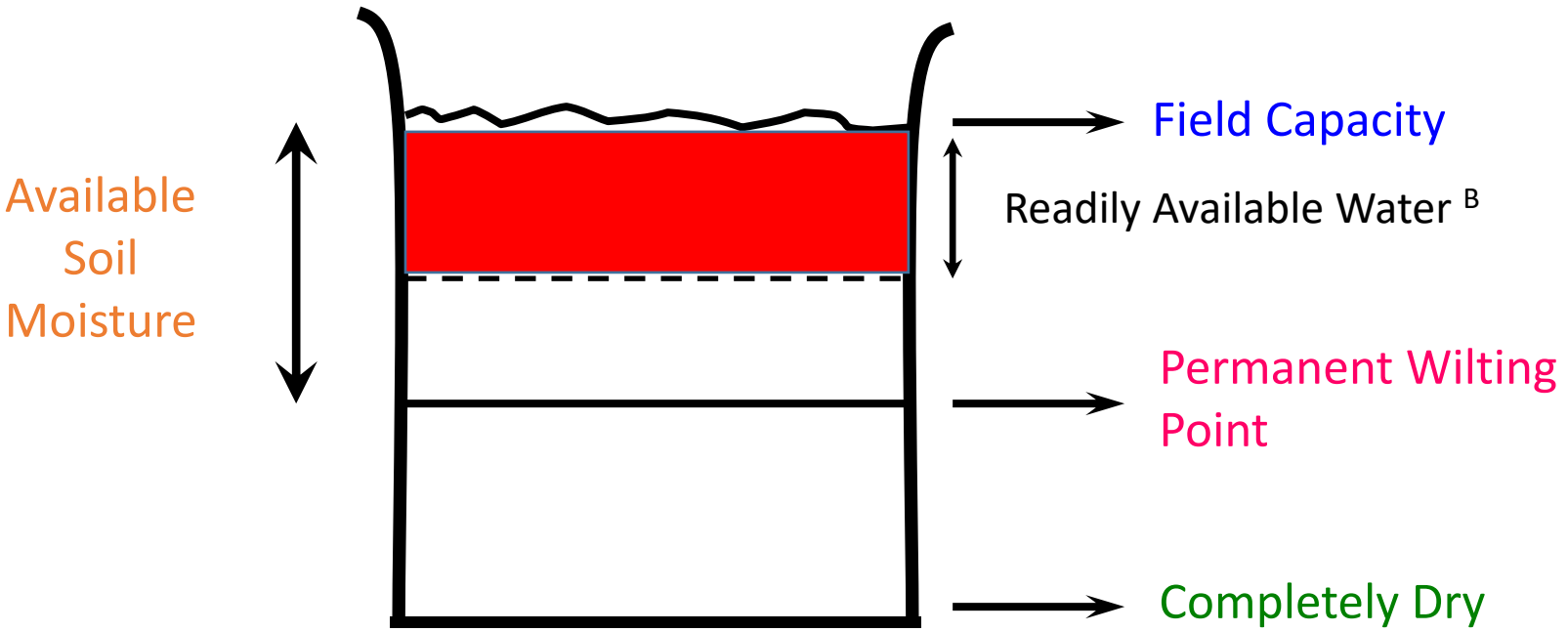




Soil Water Budgeting

Estimates of vineyard water use and the amount of water available in the soil profile are needed when utilizing the water budgeting method to determine when to start irrigating the vineyard. Once the irrigation season begins, this method can be used to determine the intervals between irrigations and the amount of water to apply for flood or furrow irrigated vines.

Illustration of Soil Moisture Terms [A]



[A] At soil saturation the beaker would be full or overflowing.

[B] Readily available water is considered to be ~50% of the available soil moisture.

Example:

- Assume – a sandy loam soil in San Joaquin Valley (Fresno area) with 4 ft. rooting depth will contain 5.52 in (1.38 in/foot) at field capacity.
- Assume – trellis at both locations is a CA sprawl on an 11 foot row spacing and that the canopy developed during the 2002 season.
- Allowable depletion is 50% (2.76 in in the SJV)
- Calculating ET_c using 2002 reference ET data obtained at each location the date of the first irrigation would occur on **May 19th** near Fresno.
- BB to bloom use about 10% total ETc (27-30 ac-in)

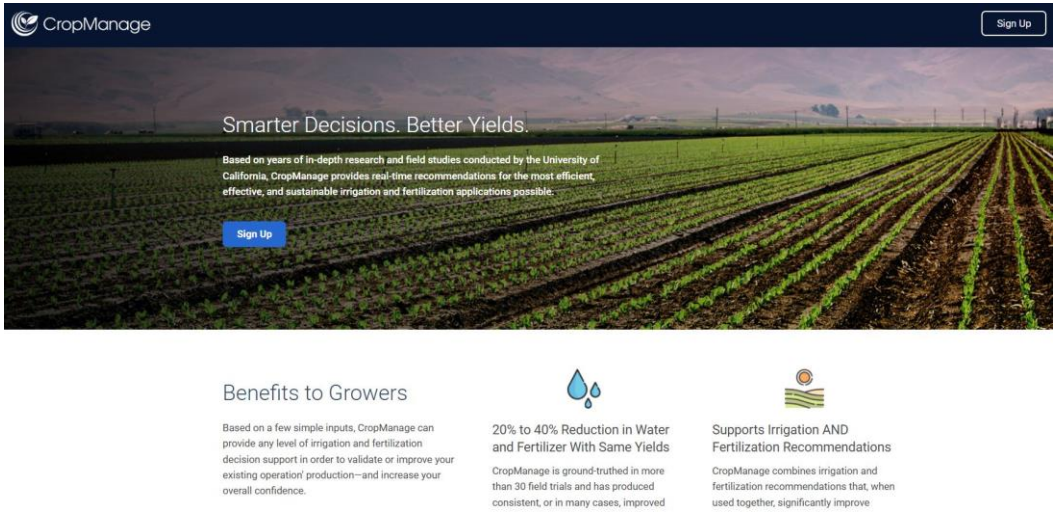
Measuring vine water status with a pressure chamber

- Pre-dawn leaf water potential - measurements taken prior to sunrise
- Midday leaf water potential - measurements taken when minimum daily would be recorded
- Stem water potential – leaf blade placed in a plastic bag covered with aluminum foil 30 to 60 minutes prior to measurement [assume leaf comes into equilibrium with that of the stem] and measurements taken at daily minimum

- > -10 bars indicates no water stress;
- < -10 bars indicates vine is water stressed

ETc = ETo × Kc × Stress

- April 19th Nut tree and vine irrigation scheduling workshop at Kearney REC near Parlier, CA
- CropManage hands-on training
- Pressure chamber hands-on training
- DU, pressure check, and more? Please ask!



ETc = ETo × Kc × Stress

- Weekly crop ET reports

PAST WEEKLY APPLIED WATER IN GALLON PER TREE OR VINE

Crops	#148 Merced				#39 Parlier				#258 Lemon Cove			
Almonds 115 Trees/A	496	425	378	331	496	449	378	354	519	449	401	354
Pistachio 106 Trees/A	349	299	249	224	349	299	274	224	349	299	274	249
Citrus 110 Trees/A	444	370	346	296	444	395	346	296	444	395	346	321
Raisin Grapes 566 Vines/A	Assume all grape			29	Assume all grape			29	Assume all grape			29
Winegrapes 622 Vines/A	irrigation type is drip			26	irrigation type is drip			26	irrigation type is drip			26
Walnuts 76 Trees/A	679	607	536	464	679	607	536	464	715	607	536	464
Stonefruit 172 Trees/A	205	189	158	142	221	189	158	142	221	189	158	142

For further information concerning all counties receiving this report, contact the Fresno Co. Farm Advisor's office at (559) 241-7526.

Acknowledgement

- Dr. Larry Williams

AMERICAN VINEYARD FOUNDATION

FERTILIZER RESEARCH AND EDUCATION PROGRAM
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CALIFORNIA GRAPE ROOTSTOCK COMMISSION