2010 Crop in Review

Bill Krueger, UC Farm Advilsor, Glenn County

Dec 2009 Freeze

Dec. 6 through 10th

Lows low 20s to mid teens 3 of 4 nights

Moderate winds 3-4 mph

Dec 7- higher temperatures (mid 20s or higher) with higher winds (8-10 mph)

Minimum Temperatures Dec 6-10, 2010

• Arbuckle, Nickels	23.6
• Willows-west	21.2
• Artois	16.8
• Orland East	17.5
• Orland Buttes 1	23
• Orland Buttes 2	17
• Orland CIMIS Rd 25 and N	18.6
• Durham CIMIS	18
• Chico CSU Farm	19.5
• Gerber CIMIS	18.4

Low temperatures recorded in California olive producing regions, 1913-1990

Site	1990 lowest temperature			Previous record low temperature			Average yearly lowest temperature	
	°F	°C	*date*	°F	°C	*year*	°F	°C
Orland	15	-9.4	23 Dec	16	-8.9	1978	24.0	-4.4
Willows	11	-11.7	22 Dec	14	-10.0	1978	23.3	-4.8
Oroville	12	-11.1	23 Dec	13	-10.6	1932	24.6	-4.1
Davis	16	-8.9	23 Dec	12	-11.1	1932	23.8	-4.6
Visalia	21	-6.1	24 Dec	13	-10.6	1913	25.4	-3.7
Porterville	16	-8.9	24 Dec	18	-7.8	1913	24.7	-4.1

Site latitude, longitude, and elevation. Orland (Glenn Co.): 39° 45'N, 122° 12'W, 254 ft. (77.4 m); Willows (Glenn Co.): 39° 32'N, 122° 12'W, 140 ft. (42.7 m); Oroville (Butte Co.): 39° 30'N, 121° 33'W, 171 ft. (52.1 m); Davis 1WSW (Yolo Co.): 38° 32'N, 121° 45'W, 51 ft. (15.6 m); Visalia (Tulare Co.): 36° 20'N, 119° 18'W, 354 ft. (107.9 m); Porterville (Tulare Co.): 36° 04'N, 119° 01'W, 393 ft. (119.8 m).

1990 Freeze

2010 Freeze

Variety Cold Hardiness

- Hardy
  - Arbequina, Aglandau, Acolano, Bouteillan, Coratina, Hojiblanca, Leccino, Maurino, Mission, Pendolino, Picudo, Picual,
- Moderate
  - Sevillano,Kalamata, Picholine,
- Sensitive
  - Manzanillo, Koroneiki, Empeltre, Frantoio, Moraiolo, Taggiasca, Arbosana?

Freeze Damage to Koroneiki Arbuckle 2010

Low temperature 23 degrees

Continuing defoliation of Manzanillo

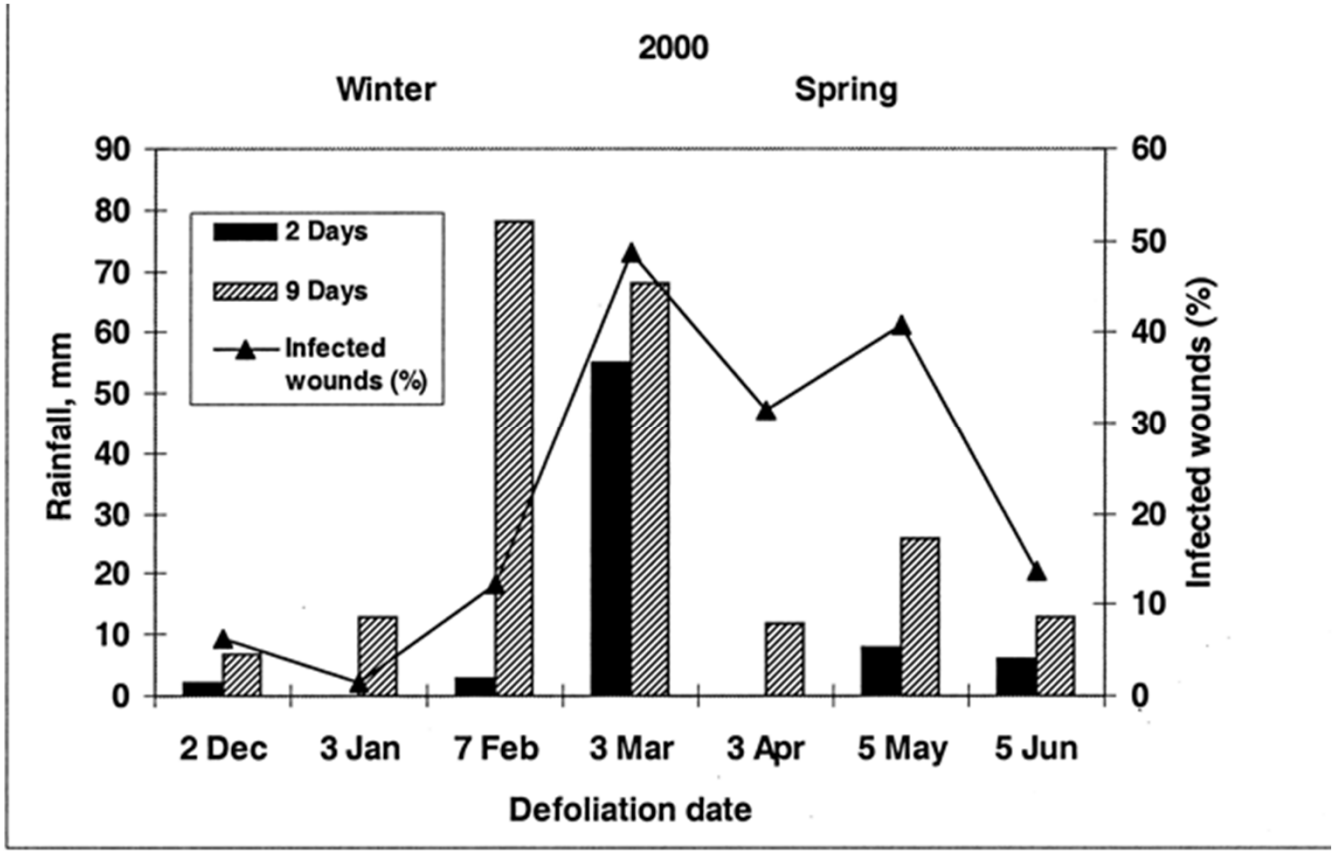
Effect of Freeze on 2010 Crop

- Table
  - Led to epidemic olive knot which reduced canopy and yield on affected trees and will take several years to recover the lost canopy
- Oil
  - Resulted in lost tonnage
  - especially in blocks which
  - produced heavily in 2009
  - Susceptible varieties
    - Arbosana, Koroneicki

Developing Olive Knot

Olive Knot Variety Susceptibility

- Very susceptible – Manzanillo, Arbequina
- Susceptible – Empeltre, Sevillano, Hojiblanca, Koroneiki, Moraiolo, Penedolino, Picual
- Resistant – Ascolano, Blanqueta, Frantoio, Leccino, Mission, Arbosana?


2000
Winter
Spring
90
80
70
60
50
40
30
20
10
0
Rainfall, mm
2 Days
9 Days
Infected wounds (%)
60
50
40
30
20
10
0
Infected wounds (%)
2 Dec
3 Jan
7 Feb
3 Mar
3 Apr
5 May
5 Jun
Defoliation date

Olive Knot Conclusions

- More olive knot develops from spring infections than fall and winter
- Copper fungicides will redistribute to protect wounds that occur after the spray is applied
- Multiple sprays improve control.

New Research Funded by the COC

Elizabeth Fichtner, UC Farm Advisor Tulare County, Carolyn Debuse, UC Yolo County, Bill Krueger, UC Glenn County and Jim Adaskaveg, UC Riverside

- Will:
  - Characterize strains of the bacteria
  - Look at epiphytic (on the leaf) populations as a predictor of Olive knot epidemics
  - Test strains for resistance to copper
  - Test efficacy of polymer films to protect injuries and extend the efficacy of copper applications

Recent Cropping History for Table Olives

- 1999 135,827
- 2000 49,331
- 2001 129,977
- 2002 94,447
- 2003 107,998
- 2004 92,245
- 2005 123,589
- 2006 16,968
- 2007 114,883
- 2008 51,543
- 2009 23,034
- 2010 164,984 More than 50% greater than the crop estimate

Bloom Dates for Manzanillo

- Full Bloom dates for 16 years - 1984 to 2010
- Range – 5-2 to 5-30 (1998)
- Average 5-15
- 2010 – 5-25

Review of Thinning Trials from 1985 to 1999 (5 Trials)

- Factors effecting response
  - Rate
  - Timing
  - Post Application temperatures
- Best correlation with maximum temperature for 2 or 3 days after application- Correlation coefficient of .42
- Warmer temperatures result in more thinning
- Cooler than average temperatures limited thinning response

Season Observations

- Abnormal season
  - Cool moist weather delayed bloom approximately 10 days later than average.
  - Lower than average heat accumulation delayed maturity and may have reduced sizing potential

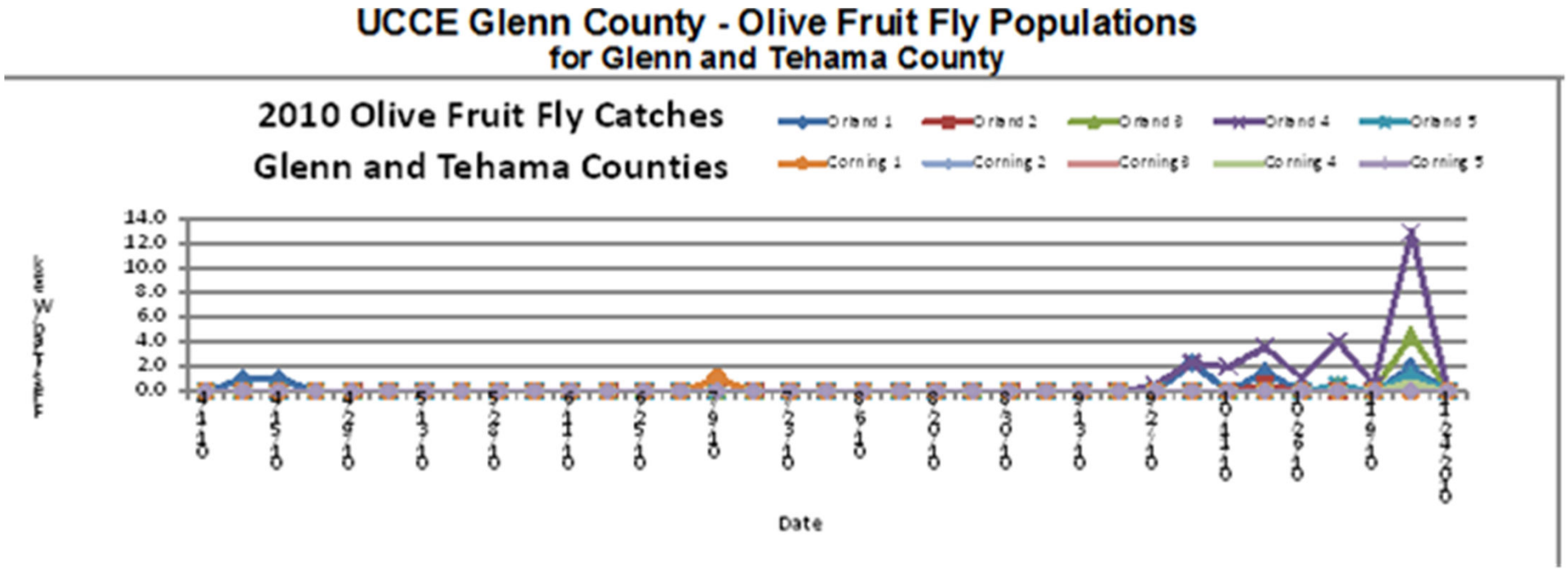
Table

- Cool post bloom weather reduced chemical thinning activity
- Crop load resulted in small fruit size and delayed maturity and small fruit size.
- Extremely long late season more than 2 months concluded at the end of Nov.
- Heavy late crop will reduce return bloom and potential crop for 2011

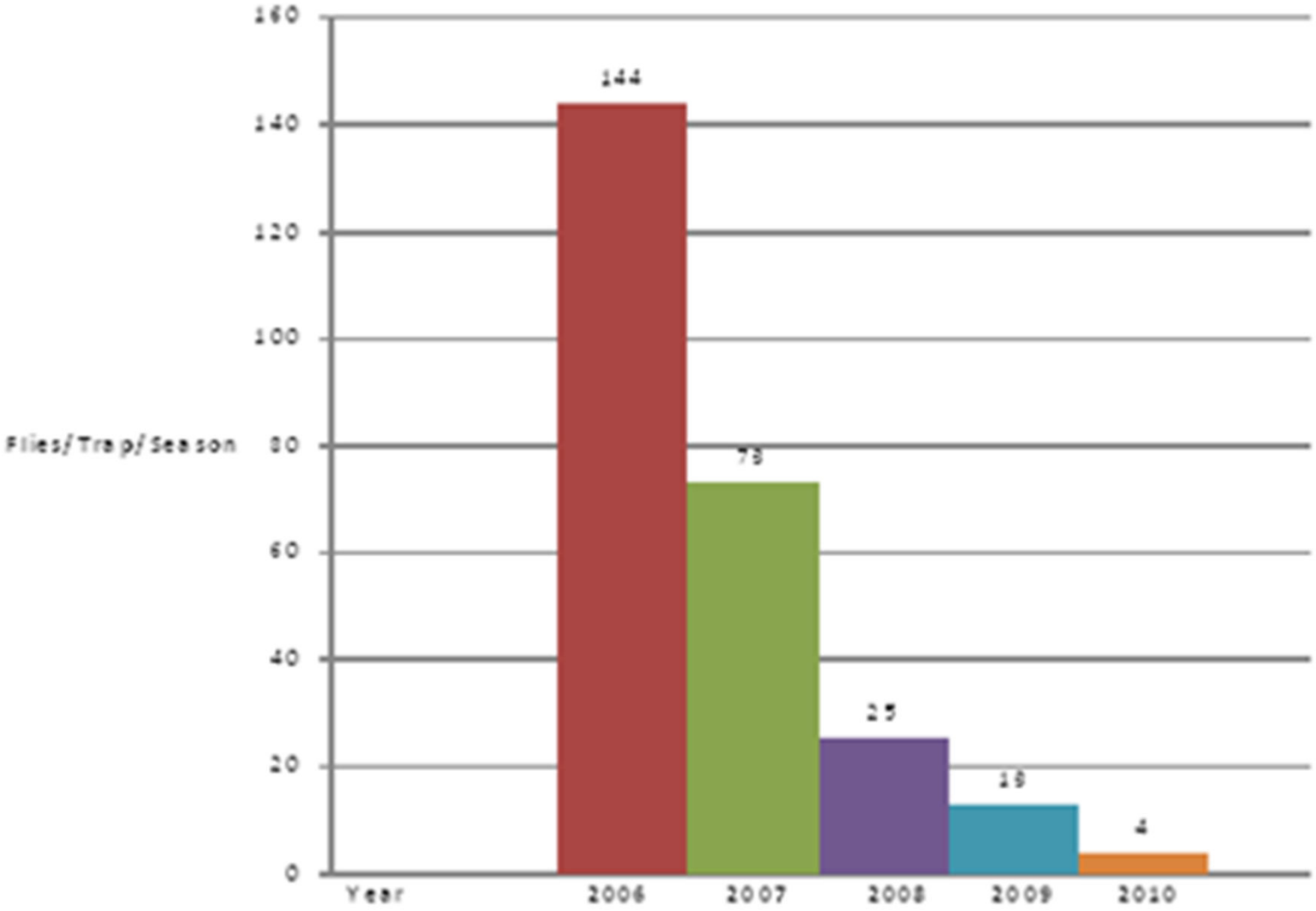
Oil

- Later harvest dates along with rainy conditions increased fruit moisture content and limited oil extraction
- Gallons per ton averages were lower due to late season immature fruit.
- Mild summer and over irrigation may have contributed to difficulty with oil extraction.

Olive Fly Trap Catch Results



Olive Fly Trap Catches 2004-2010 Flies per trap per season



Olive Fly Observations, Concerns and Recommendations

- Olive Fly trap catches came back at the end of the season to levels equal to 2007
- Some infested fruit was reported at the canners at the end of the year
- Fruit left on the tree and is still there in some cases
- Monitor population early and treat if necessary
- http://ceglenn.ucdavis.edu/OrchardCrops_MainPage/Olives/
- Black Scale populations can aid in olive fly survival

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

2011

SAMPLE COSTS TO ESTABLISH A HIGH DENSITY OLIVE ORCHARD AND PRODUCE

TABLE OLIVES

SACRAMENTO VALLEY

William H. Krueger	UC Cooperative Extension Farm Advisor, Glenn & Tehama Counties
Karen M. Klonsky	UC Cooperative Extension Economist, Department of Agricultural and Resource Economics, UC Davis
Richard L. De Moura	UC Cooperative Extension Staff Research Associate, Department of Agricultural and Resource Economics, UC Davis

Nickels Hedgerow

Treatment	2004	2005	2006	2007	2008			Cum. Yield
Year	4th	5th	6th	7th	8th			
	Tons/A	Tons/A	Tons/A	Tons/A	Tons/A	$/Ton	$/A	Tons/A
Conventional	4.09	1.75	2.81	6.39	5.96	$1,060	$6,137	21.00
Free Standing	3.66	1.51	2.26	6.40	5.04	$948	$4,594	18.85
Trellised, Woven	4.21	1.68	2.28	6.07	5.88	$1,004	$5,875	20.12
Trellised, Tied	3.58	3.45	1.76	7.51	4.52	$1,104	$4,983	20.82
Average	3.89	2.10	2.28	6.59	5.35	$1,029	$5,397	20.20

No Significant Differences

Free Standing Narrow Canopy Hedgerow at pruning 2007

•Train straight trunk
•Sucker frequently to 36 inches to develop smooth straight trunk

•Will be adaptable canopy or trunk shaking or other types of harvesters

DEVELOPMENT OF BASELINE DATA FOR USING STEM WATER POTENTIAL FOR OLIVES

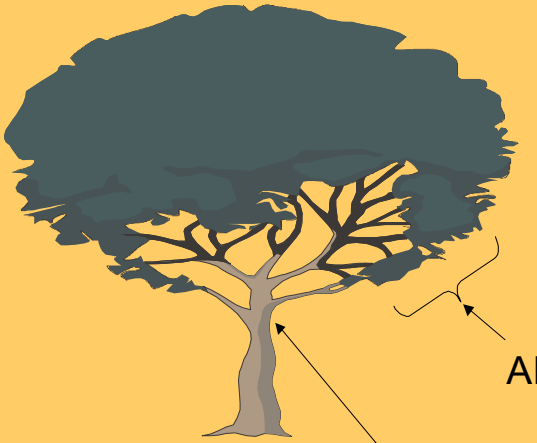
Bill Krueger and Allan Fulton, UCCE Glenn and Tehama Counties

Stem Water Potential

- Use in Almonds, Walnuts and Prunes
- A technique to determine tree water status at a given point in time- what the tree is sensing
- Measured between noon and 4 p.m.

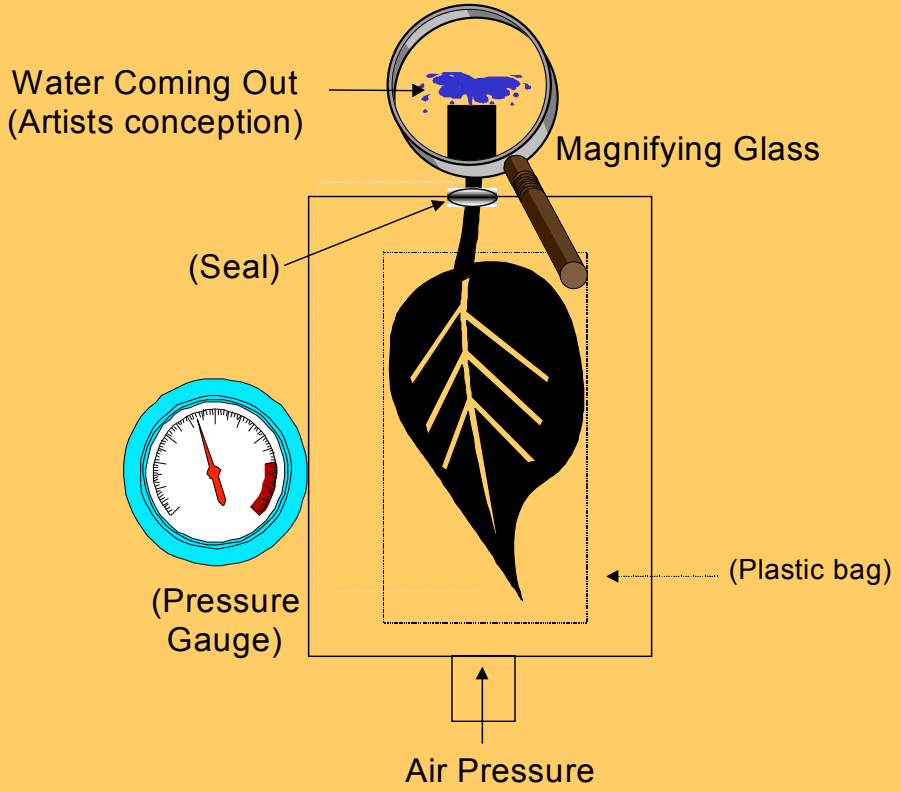
How is Tree Stress (Stem Water Potential) Measured, Conceptually?

Plant based irrigation scheduling



Alternate position(s)

Preferred leaf sampling position



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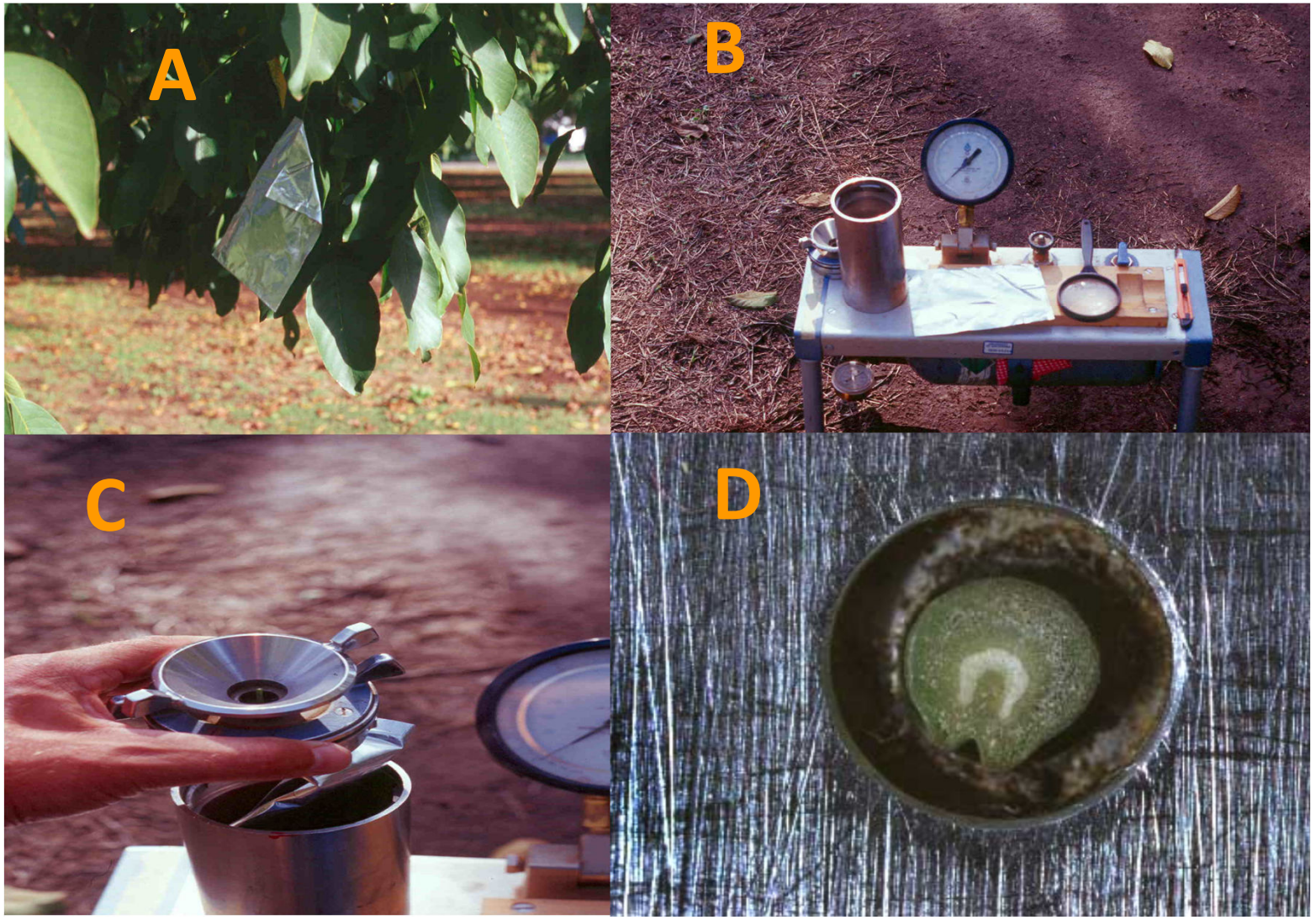
How is midday SWP Measured in the Field?



Baseline

- Predicts stem water potential (SWP) readings when water is not limited under varying environmental condit0ns
- Collect SWP and climatic data under non limiting moisture conditions over a range of weather conditions
- Data correlated with temperature and relative humidity to develop baseline tables that predict SWP across a wide range of weather conditions

Table 1. Values of midday stem water potential (SWP in Bars tension) to expect for fully irrigated walnut trees under different conditions of air temperature and relative humidity.

(Table courtesy of Ken Shackel, Department of Pomology, University of California Davis)

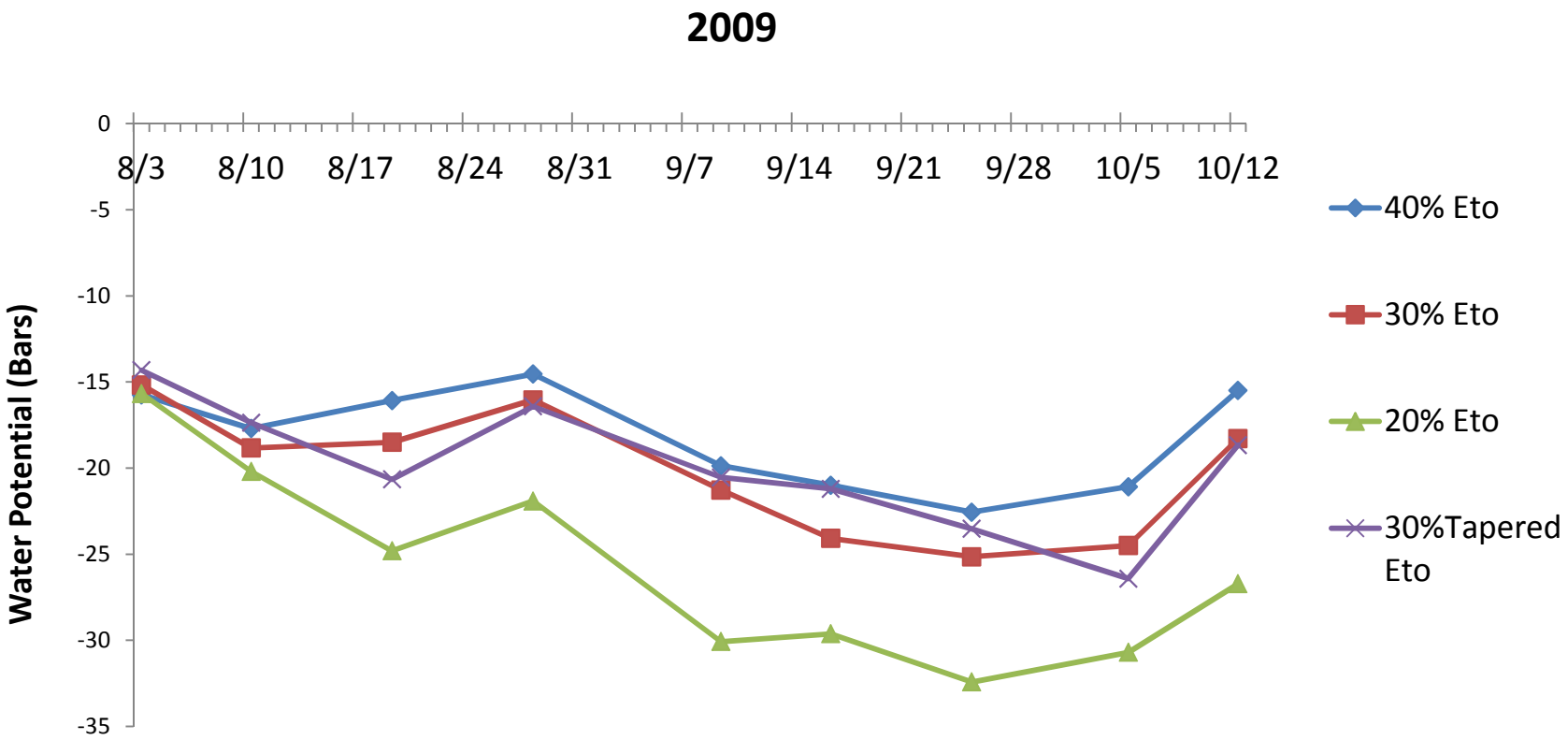
Air	Air Relative Humidity															
Temp (F)	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
60	-3.8	-3.7	-3.7	-3.6	-3.6	-3.5	-3.5	-3.4	-3.3	-3.3	-3.2	-3.2	-3.1	-3.1	-3.0	-2.9
62	-3.9	-3.8	-3.8	-3.7	-3.6	-3.6	-3.5	-3.4	-3.4	-3.3	-3.3	-3.2	-3.1	-3.1	-3.0	-3.0
64	-4.0	-3.9	-3.8	-3.8	-3.7	-3.6	-3.6	-3.5	-3.4	-3.4	-3.3	-3.2	-3.2	-3.1	-3.0	-3.0
66	-4.0	-4.0	-3.9	-3.8	-3.8	-3.7	-3.6	-3.5	-3.5	-3.4	-3.3	-3.3	-3.2	-3.1	-3.1	-3.0
68	-4.1	-4.1	-4.0	-3.9	-3.8	-3.8	-3.7	-3.6	-3.5	-3.5	-3.4	-3.3	-3.2	-3.2	-3.1	-3.0
70	-4.2	-4.1	-4.1	-4.0	-3.9	-3.8	-3.7	-3.7	-3.6	-3.5	-3.4	-3.3	-3.3	-3.2	-3.1	-3.0
72	-4.3	-4.2	-4.2	-4.1	-4.0	-3.9	-3.8	-3.7	-3.6	-3.6	-3.5	-3.4	-3.3	-3.2	-3.1	-3.0
74	-4.4	-4.3	-4.2	-4.2	-4.1	-4.0	-3.9	-3.8	-3.7	-3.6	-3.5	-3.4	-3.3	-3.2	-3.1	-3.1
76	-4.5	-4.4	-4.3	-4.3	-4.2	-4.1	-4.0	-3.9	-3.8	-3.7	-3.6	-3.5	-3.4	-3.3	-3.2	-3.1
78	-4.7	-4.6	-4.5	-4.4	-4.2	-4.1	-4.0	-3.9	-3.8	-3.7	-3.6	-3.5	-3.4	-3.3	-3.2	-3.1
80	-4.8	-4.7	-4.6	-4.5	-4.3	-4.2	-4.1	-4.0	-3.9	-3.8	-3.7	-3.6	-3.5	-3.3	-3.2	-3.1
82	-4.9	-4.8	-4.7	-4.6	-4.5	-4.3	-4.2	-4.1	-4.0	-3.9	-3.7	-3.6	-3.5	-3.4	-3.3	-3.1
84	-5.1	-4.9	-4.8	-4.7	-4.6	-4.4	-4.3	-4.2	-4.1	-3.9	-3.8	-3.7	-3.5	-3.4	-3.3	-3.2
86	-5.2	-5.1	-5.0	-4.8	-4.7	-4.5	-4.4	-4.3	-4.1	-4.0	-3.9	-3.7	-3.6	-3.5	-3.3	-3.2
88	-5.4	-5.2	-5.1	-4.9	-4.8	-4.7	-4.5	-4.4	-4.2	-4.1	-3.9	-3.8	-3.6	-3.5	-3.4	-3.2
90	-5.6	-5.4	-5.2	-5.1	-4.9	-4.8	-4.6	-4.5	-4.3	-4.2	-4.0	-3.9	-3.7	-3.6	-3.4	-3.2
92	-5.7	-5.6	-5.4	-5.2	-5.1	-4.9	-4.7	-4.6	-4.4	-4.3	-4.1	-3.9	-3.8	-3.6	-3.4	-3.3
94	-5.9	-5.7	-5.6	-5.4	-5.2	-5.0	-4.9	-4.7	-4.5	-4.4	-4.2	-4.0	-3.8	-3.7	-3.5	-3.3
96	-6.1	-5.9	-5.7	-5.6	-5.4	-5.2	-5.0	-4.8	-4.6	-4.4	-4.3	-4.1	-3.9	-3.7	-3.5	-3.3
98	-6.3	-6.1	-5.9	-5.7	-5.5	-5.3	-5.1	-4.9	-4.8	-4.6	-4.4	-4.2	-4.0	-3.8	-3.6	-3.4
100	-6.5	-6.3	-6.1	-5.9	-5.7	-5.5	-5.3	-5.1	-4.9	-4.7	-4.5	-4.2	-4.0	-3.8	-3.6	-3.4
102	-6.8	-6.6	-6.3	-6.1	-5.9	-5.7	-5.4	-5.2	-5.0	-4.8	-4.6	-4.3	-4.1	-3.9	-3.7	-3.4
104	-7.0	-6.8	-6.6	-6.3	-6.1	-5.8	-5.6	-5.4	-5.1	-4.9	-4.7	-4.4	-4.2	-4.0	-3.7	-3.5
106	-7.3	-7.0	-6.8	-6.5	-6.3	-6.0	-5.8	-5.5	-5.3	-5.0	-4.8	-4.5	-4.3	-4.0	-3.8	-3.5
108	-7.6	-7.3	-7.0	-6.8	-6.5	-6.2	-6.0	-5.7	-5.4	-5.2	-4.9	-4.6	-4.4	-4.1	-3.8	-3.6
110	-7.8	-7.6	-7.3	-7.0	-6.7	-6.4	-6.2	-5.9	-5.6	-5.3	-5.0	-4.7	-4.5	-4.2	-3.9	-3.6
112	-8.1	-7.8	-7.5	-7.2	-7.0	-6.7	-6.4	-6.1	-5.8	-5.5	-5.2	-4.9	-4.6	-4.3	-4.0	-3.7
114	-8.5	-8.1	-7.8	-7.5	-7.2	-6.9	-6.6	-6.3	-5.9	-5.6	-5.3	-5.0	-4.7	-4.4	-4.0	-3.7
116	-8.8	-8.5	-8.1	-7.8	-7.5	-7.1	-6.8	-6.5	-6.1	-5.8	-5.5	-5.1	-4.8	-4.4	-4.1	-3.8
118	-9.1	-8.8	-8.4	-8.1	-7.7	-7.4	-7.0	-6.7	-6.3	-6.0	-5.6	-5.3	-4.9	-4.5	-4.2	-3.8
120	-9.5	-9.1	-8.8	-8.4	-8.0	-7.6	-7.3	-6.9	-6.5	-6.1	-5.8	-5.4	-5.0	-4.6	-4.3	-3.9

Common ranges of SWP under cool weather conditions

Common ranges of SWP under normal weather conditions

Common ranges of SWP under hot weather conditions

Regulated Deficit Irrigation Trial



Plans and Procedures

- Monitor SWP in at least 5 orchards April through Sept. where soil moisture is not limited
  - Use inline flow meters to measure applied water to assure that it meets or exceeds Etc
  - One local orchard has been equipped with Water Mark soil moisture monitoring devices – used to determine field capacity and therefore fully irrigated
  - SWP and corresponding temperature and relative humidity data will be analyzed using multiple linear regression analysis to develop a baseline table for a broad range of weather c0nditions.

Outcomes

- Increase precision of water status control
- Determine if water status is a limiting factor in growth and production
- Minimize economic loss when water is limited
  - Under irrigation of table olives reduces shoot growth and fruit size
  - There are times of the year (mid summer) when mild water stress can be tolerated with less economic impact
- Can be used to assess assumptions about root zone depths and to assure that soil moisture monitoring is representative when soil variability is a concern
- Used to achieve a variety of horticultural, production and water management objectives