Gardening in the Foothills Environment

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The Earth is Not A Toy
Treat It As If Were Your Home
Because...

IT IS!
Topics For Today

I. Climate Classifications & Hardiness Zones
II. Effects of Light on Plant Growth and Development
III. Effects of Temperature on Plant Growth
IV. Terrain Effects
V. Micro-Climates
VI. Frosts
VII. Making Your Own Weather Forecast
I. Climate Classifications & Hardiness Zones

Kőppen
USDA Hardiness Zones
American Horticulture Society Heat Zones
Sunset Western Climate Zones
Applying Hardiness Zones to Plant Selection
Classifications & Hardiness Zones

Factors used in Developing:
• Wind
• Moisture
• Amount of Sunlight
• Radiation and Light Intensity
• Temperature
• Air Pollution
• Terrain and Elevation
• Latitude
Kőppen Climate Classification

Why Do We Look at This?

What Is It?
Source: Köppen-Geiger climate classification published by Kottek et al. (2006) and Rubel and Kottek (2010); http://koeppen-geiger.vu-wien.ac.at/
Kőppen Climate Classification

Based on Five Major Climate Groups:

A - Tropical, Rainy, No Cool Season
B - Dry Climates
   S - Semi-Arid Steppe
   W - Arid or Desert
C - Middle Latitude, Rainy Mild Winter
D - Middle Latitude, Rainy Severe Winter
E - Polar, No Warm Season
   T - Tundra
   F - Ice Cap
Kőppen Classification

Major Climate Groups Subdivided into Climate Types:

a - Hot Summer, Av Temp of Warmest Month >71.6 F
b - Cool Summer, Av Temp of Warmest Month <71.6 F
f - No Dry Season
s - Dry Season in Summer, at Least 3 times as much rain in wettest month of winter as in driest month of summer, and driest month of summer receives <1.2 inches
w - Dry Season in Winter
Kőppen Classification

What Kőppen Climate Do We Live In?

First Look at Major Groups

Then Look at Climate Types
Kőppen Classification

What Kőppen Climate Do We Live In?

Csa

Also Known As?
Kőppen Classification

What if You Live in Pollock Pines?
Kőppen Classification

Pollock Pines  Dfb

Why Dfb?
Kőppen Classification

What’s The Point?
USDA Hardiness Zones

Divides country into 26 Zones

Zones based on lowest winter temperature

Plants categorized into zones based on lowest winter temperature they can survive
USDA Hardiness Zones
Entire US

Source: http://planthardiness.ars.usda.gov/PHZMWeb/
USDA Hardiness Zone

What USDA Zone Are We In?

Source: http://planthardiness.ars.usda.gov/PHZMWeb
USDA Hardiness Zones

Camino to Cameron Park 9a
Winter Temp 20-25 F

Cameron Park to Sacramento 9b
Winter Temp 25-30 F

Pollock Pines 8b
Winter Temp 15-20

Higher, above Pollock Pines, or in deep valleys near Pollock Pines 7a to 8a
Winter Temp 0-15 F
American Horticultural Society (AHS) Heat Zones

Zones based on plant adaptability to summer heat

Zones calculated on average number of days when temperature Above 86 F/ 30 C

Why 86 F?

There are 12 Zones
AHS Heat Zones

Source: http://www.ahs.org/gardening-resources/gardening-maps/heat-zone-map
AHS Heat Zones

What Heat Zone are we?

Zone 8
91-120 Days When Av Temp Is Above 86 F

What Heat Zone is Pollock Pines?

Zone 7
51 to 90 Days Above 86 F
Sunset Western Climate Zones

Zones developed strictly for western states

Based on many different factors

26 Zones and Sub-Zones in Western US
Sunset Western Climate Zones

Source: http://sunsetwesterngardencollection.com/climate-zones/zone/northern-california
Sunset Western Climate Zones

What Sunset Zone Do You Live In?

Zone 9:
- El Dorado Hills
- Cameron Park

Zone 7:
- Rescue
- Shingle Springs
- Diamond Springs
- Placerville
- Camino

Zone 1A: Pollock Pines
Sunset Western Climate Zones

Zone 9 – Winter Lows 34-38 F Extremes 16 F Rainfall 20 Inches

Zone 7- Winter Lows 26-35 F Extremes 0 F Rainfall 34 Inches

Zone 1A – Winter Lows 0-11 F Extremes -15 to -50 F Snow
HUH? Pollock Pines?

Actually Zone 3B is better description of Pollock Pines, though it is in Washington State
Summer Av 93 F
Winter 19-29 F Extreme -2 to -5 F
180-200 Frost Free Days
Applying Hardiness Zones to Plant Selection

Use Nursery or Catalog Zone listings with caution

You must know what Zone system is being used

Seed packages and catalogs use?

Local Nurseries use?
Applying Hardiness Zone to Plant Selection

Problem: I go to a nursery and buy a plant. Nursery person says it is a Zone 7 plant. That night, I order a plant from a catalog, also Zone 7.

Question: Will both plants survive if I live in Cameron Park? How about if I live in Pollock Pines?
Applying Hardiness Zone to Plant Selection

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<table>
<thead>
<tr>
<th>USDA</th>
<th>Sunset Western</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameron Park</td>
<td>9A  20-25 F</td>
</tr>
<tr>
<td>Pollock Pines</td>
<td>8B  15-20 F</td>
</tr>
<tr>
<td></td>
<td>3B  19-29 F</td>
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II. Effects of Light on Plant Growth and Development

Photosynthesis
Light Intensity
Light Duration
Factors Affecting Duration and Intensity
Photosynthesis

Light Essential To:
Formation of Chlorophyll
Providing Energy to Produce Food

Plant Response to Light Depends on:
Light Intensity
Light Duration
Light Wave Length
Photosynthesis

Plant’s metabolic response to light consists of two processes:

Photosynthesis

Respiration
Photosynthesis

Plant Metabolism

Water → Light → Photosynthesis → Sugars → Starch (stored food)

Carbon dioxide → Carbon dioxide → Oxygen → Soil Minerals

Carbon dioxide → Oxygen → Water → Respiration → Energy

(Used in the synthesis of plant products at right)

Pectin → Cellulose → Lignin → Fats → Proteins → Pigments → Hormones → Vitamins

Cell Walls → Cutin → Membranes → Enzymes

Alkaloids, tannin and other protective substances.
Light Intensity

Effects of High Light Intensity:

• Photosynthesis dominates
• Plant energy directed toward food production
• Transpiration speeds up as intensity increases
• Photosynthesis increases as light intensity increases ...to a point
• What happens if light becomes too intense?
Effects of High Light Intensity:

If light becomes too intense, photosynthesis ceases

Why?

Chlorophyll concentration/amount varies with light intensity
Light Intensity

Effects of Intense Light:

• Re-orientation of leaves
• Leaves fold or droop
• Chlorophyll moved
Light Intensity

Effects of Low Light Intensity:

• Respiration dominates
• Energy directed toward plant growth
• Transpiration slows
• Photosynthesis decreases
Light Intensity

Effects of Insufficient Light:

As light drops below the minimum required, plant undergoes formative and structural changes

Alteration of color
Etiolation
Light Intensity

Etiolation:

• Spindly growth
• Reduction in leaf size
• Soft, succulent growth
• Cessation of reproductive function
• Very common in house plants

! Caution !
Light Intensity

Example of Plant Light Sensitivity- Star Thistle

• Little or none grows in shade (< 8 hours)
• Light reduction of 30% reduces seed production up to 60%
• Low light reduces root growth – consequences for summer survival
Light Intensity

Plant Light Requirements:

Some plants thrive in full light intensity
(Full Sun = 6+ hours of direct sunlight)

Some plants thrive in less intense light
(Partial Sun/Partial Shade = 4 - 6 hours)

Some plants thrive in little light
(Shade or less than 4 hours)
Light Intensity

Plant Light Requirements:

Shade plants may be damaged if exposed to full light

Sun plants may grow poorly in low intensity light
Light Duration

Affects plant’s ability to flower and reproduce

Favorable length of day for a plant to flower and reproduce called its Photoperiod
Light Duration

Classification Based on Photoperiodic Response

Short Day: Plants flower only within a range of photoperiods shorter than a critical photoperiod, usually less than 14 hours.

Long Day: Plants flower only under a range of photoperiods longer than a critical photoperiod, usually longer 10 hours.

Day Neutral: Plants flower over a wide range of day-lengths from relatively short to continuous (24 hours)

Intermediate: Plants flower only under day-lengths within a certain range and fail to flower under either longer or shorter periods, usually between 12 and 14 hours
Light Duration

Classification Short or Long Day has nothing to do with the actual day length at which the plant will flower, but with:

If the plant doesn’t bloom because day length is shorter than a critical length, the plant is a Long Day plant

If the plant doesn’t bloom because day length is longer than a critical length, the plant is a Short Day plant
Light Duration

Photoperiodic Response of Plants

Flowering occurs on day lengths indicated by color bands
Light Duration

In some plants, the photoperiod for flowering is different from that for fruiting – (handout) “Photoperiodic Response of Selected Plants”

Different varieties within the same species often differ in photoperiodic response

Natural bloom period of Long Day plants is in late spring or early summer

Natural bloom period of Short Day plants is spring, late summer or fall
Light Duration

Measuring Light Duration:

Civil Twilight
Nautical Twilight
Astronomical Twilight

How does the plant measure day length?
Factors Affecting Duration and Intensity

Natural Factors Affecting Duration and Intensity

Latitude
Elevation
Slope
Factors Affecting Duration and Intensity

Slope – North vs. South

North: Less intense, Shorter duration

South: More intense, Longer duration
Factors Affecting Duration and Intensity

Slope – Steep vs Shallow

Steep:
More perpendicular, More intense

Shallow:
Shallow grazing angle, Less intense
Factors Affecting Duration and Intensity

Plant receives both direct and reflected light:

- Increasing intensity
- A natural micro-climate
Factors Affecting Duration and Intensity

Man-Made Features

Fence or wall

Shade:
Low intensity

High intensity: Similar to cliff
Factors Affecting Duration and Intensity

Man-Made Features

Shade
Low intensity

Very intense
Factors Affecting Duration and Intensity

Morning vs. Afternoon Intensity

A = B
III. Effects of Temperature on Plant Growth

• Temperature Ranges for Plant Growth
• Chilling Requirements
• High and Low Temperature Effects
• Factors Affecting Temperature
Temperature Ranges For Plant Growth

Ranges: Optimal
  Upper Maximum
  Lethal Maximum
  Lower Minimum
  Lethal Minimum

Ranges Vary by Plant
Temperature Ranges For Plant Growth

Thermal Response of Tomatoes Model

Source: Agricultural Meteorology by J Y Wang
Temperature Ranges For Plant Growth
Thermal Response of Sweet Corn Model

Source: Agricultural Meteorology by J Y Wang
Chilling Requirements

An accumulation of hours at or below a given temperature to enhance or initiate:

- Germination
- Bloom
- Fruit Set

Applies to winter dormancy
Reference temperature is usually 45° F
Chilling Requirements
Thermal Response of Apples Model

Source: Agricultural Meteorology by J Y Wang
Chilling Requirements

Apples - 700-800 hours lower elevations
1200-1500 hours higher elevations

Tulips and Other Bulbs – Refrigerate
High and Low Temperature Effects

High Temperature Consequences:

Retarded growth
Undersized or non-maturing flowers and fruits
Localized killing of tissues – sunburn
Localized killing of stem tissue – heat cankers
Defoliation or premature leaf drop
Premature fruit ripening
Death of entire plant
High and Low Temperature Effects

Low Temperature Consequences:

Reduction of growth, and finally cessation
Cessation of chlorophyll formation
Death of plant
Factors Affecting Temperature
Location With Respect to House

N
Cool
Shade Lovers

W
Hot
Sun Lovers

E
Cool
Partial Shade

S
Hot
Sun Lovers
Factors Affecting Temperature

Location With Respect to House

N: Cool or cold
S: Warm or hot
Factors Affecting Temperature

Location under a tree canopy
Location in low spots or valleys
(Cold air drainage - Discuss later)
Location near bodies of water
IV. Terrain Effects

Characteristics of Cold Air Slopes and Valleys
Upslope Winds
Down Slope Winds
Effects of Elevation on Growing Season
Characteristics of Cold Air

Dense Cold Air
Drains High to Low
Pools in Low Areas

Less dense warm air tends to rise

Dense cold air drains high to low pools in low areas
Slopes vs. Valleys - Cold Air Drainage

Cold Air flows downhill

Outgoing Heat

Relatively Warm

VERY COLD
Slopes vs. Valleys – Cold Air Drainage

Cold air pools in valleys
Significant affect on growing season
Persistence of fog and low clouds
Slopes vs. Valleys

Implications:

Crop Location
Fruit Trees
House Construction
Slopes vs. Valleys
Sacramento Valley

Day 1 or 2
Fog Forms

Cold air
Inversion lid
Heat loss

Day 2 or more
Mixing Below
Fog Lifts
Low overcast at inversion base

Cold air
Inversion lid

Stratus Overcast
Heating from ground
Upslope (Valley) Wind

Daytime Occurrence

Heating of the Ground Causes Rising Air

Rising Warm Air

Surface Heating

Rising Warm Air
Upslope (Valley) Wind

Ground surfaces heat rapidly

Air above valley heats more slowly - is cooler, sinks
Upslope (Valley) Wind

Sinking cool air over valley leaves no place for rising warm air to go
SO: It is forced upslope
Rising air at top of slope helps pull warm valley air upslope
Upslope (Valley) Wind

Eventually, a circulation system is established.
Upslope (Valley) Wind

Consequences: Hot, dry wind blows upslope
Begin late morning
Ends early evening
Air pollution

Protection Strategies: Blocking
Misting
Relocation
Down slope (Mountain) Wind
Night Time Occurrence

Outgoing Radiation Cools Air

Cold Air Flows Down Hill Into Valley
Down slope (Mountain) Wind

Air above valley cools more slowly, is warmer, and rises.
Down slope (Mountain) Wind

Sinking cold mountain air is aided by rising warmer air over valley. Creates a cool breeze early in morning.
Down slope (Mountain) Wind

Eventually a circulation system is established

**Consequences:** May be beneficial or not, depending on:
- Strength of Flow
- Temperature of Air
- Time of Year

Here, in western El Dorado County, generally produces a refreshing, cooling breeze on summer mornings

**Upslope** wind usually stronger than down slope
Combining Slope, Temperature and Light Effects

- **High Intensity DAY**
- **Low Intensity NIGHT**
- **Hot**
- **Cool**

- **Cold**
Effects Of Elevation on Growing Season

Temperature decreases with elevation
Acts to reduce length of growing season
Micro-Climates can alter pattern somewhat

Gold Hill Banana Belt
Graham’s Pear Shed
Hooverville Orchards
Folsom Lake
Effects of Elevation on Growing Season

Figure 11.—Average length of growing season.
V. Micro-Climates

Natural Micro-Climates

Micro-Climates Around the House

Creating Your Own Micro-Climate
Natural Micro-Climates

Slopes: Cold air drainage
North vs. south facing

Ridges, valleys, canyons, and low spots

Proximity to large bodies of water
Micro-Climates Around the House

Survey your yard for micro-climates:

- Which side of the house
- Fences & walls
- Patio & deck
- Court yards
- Sloping yards
- Trees vs. open areas
- Moist vs. dry areas
Creating Your Own Micro-Climates

Wind breaks (Shelter Belts)
Shading
Evergreen vs. deciduous trees
Misting
Creating Your Own Micro-Climates: Shelter Belts

Shelter Belts and Wind Breaks are the same

Shelter Belt generally refers to a larger scale Wind Break

Both refer to a belt of trees or shrubs planted to break up and slow the wind
Creating Your Own Micro-Climates: Shelter Belts
Why Have a Shelter Belt

HOME
• Save fuel
• Cooler in summer, warmer in winter
• Improve home appearance with species providing seasonal colors, foliage, & textures
• Protect plants from winds & keep down dust
• Screen objectionable views
Creating Your Own Micro-Climates: Shelter Belts
Why Have a Shelter Belt

AGRICULTURE

• Reduce soil and evapo-transpiration loss
• Influence disposition of snow drifts
• Foster wildlife habitat
• Reduce feed bills
• Protect field crops
Creating Your Own Micro-Climates:
Types of Shelter Belts

I - open throughout height of belt
II - dense throughout height of belt
III - medium density below & dense above
IV - medium density above & open below

Source: Agricultural Meteorology, J Y Wang
Creating Your Own Micro-Climates: Shelter Belts - Farmstead Wind Break

A farmstead wind break means real protection to both home and livestock against wind and snow. With care, fuel consumption in the home can be reduced by 20 to 50 percent. Experiment stations have shown that feedlot livestock will gain faster and require less feed.

If space is available, a multiple-row dense barrier is suggested for ultimate protection of the farmstead.
Creating Your Own Micro-Climates: Shelter Belts - Design and Arrangement

• Protection proportional to height & density more than width
• The taller the tree, the more rows required
• Rows need to extend beyond & be at least 100 ft from protected area
• Wind controlled 2-5 times height (windward side), and 10-20 times height (lee side)
• Belts most effective planted perpendicular to prevailing wind
• Avoid breaks and gaps in the belt
Creating Your Own Micro-Climates: 
Shelter Belts
Cautions: Improperly-constructed shelter belts can increase windspeed
Extend the belt slightly beyond area to be protected
Creating Your Own Micro-Climates: Shelter Belts

Cautions: Avoid Breaks or Gaps in the Belt

Driveway entrance:

NO:  

YES:

The Venturi Effect

25 mph  
15 mph  
30 mph
Creating Your Own Micro-Climates: Shelter Belts

Cautions:

• Locate planting or building area properly

• Shading can be good or bad

• Lee-side rain shadow
Creating Your Own Micro-Climates: Shelter Belts

Row Spacing:  Dependent on annual rainfall
Less than 12 inches, space rows 22-30 feet
More than 12 inches, space rows 18-26 feet

Selecting Plants:
Coniferous evergreens and evergreen shrubs that branch close to ground are most effective year-round

Deciduous trees and shrubs most effective in summer, but have a modifying effect in winter
Creating Your Own Micro-Climate: Shelter Belts

Controlling Snow

Shelter belts (snow fences) can control drift formation

Open shelter belts create drifts on the lee side

Dense shelter belts create drifts on both sides
Creating Your Own Micro-Climates: Shading

Shade trees significantly reduce home air conditioning costs

Large shade trees release 100 gallons of water on a hot day

• Humidifies air

• Cooling effect = 5 average size a/c’s running 24 hr/day

Net cooling effect 10-15 degrees cooler under canopy

Also applies to garden areas, **BUT:**
Creating Your Own Micro-Climate: Shading

Outdoor landscaping greatly affects temperature inside the house...

Unshaded house

Shaded from PM sun

Fully shaded

...this fact is illustrated here showing temperature range inside similar homes with various density of exterior planting

Source: Sacramento Bee
Planting Trees Close to House Makes a Difference

The taller the tree, the longer its shadow!
Creating Your Own Micro-Climates: Evergreen vs. Deciduous Close to House

When planting trees close to house, does it make a difference where I plant Coniferous (or Evergreen) trees vs. deciduous trees?

IF SO, WHY?
Creating Your Own Micro-Climates: Evergreen vs. Deciduous
Creating Your Own Micro-Climates: Misting

Misting can be used to:

- Humidify air
- Cool air
- Keep plants cool

Source: Koolfog
VI. Frosts

Frosts and Growing Season

Causes of Frost

Kinds of Frost

Effect of Soils, Mulch and Snow

Protecting Against Frost

Planting Times
Frosts and Growing Season

Growing Season- period between last killing frost in spring, and first killing frost in fall

Killing frost varies for different plants
• Usually thought of as 32 F
• Citrus usually frost hardy to 28 F

Source: The University of Arizona Cooperative Extension
Frosts and the Growing Season

Length of time below 32 F is key - generally 2 hours or more

Extended cold spells – over several nights – are more damaging
Causes of Frost

Radiation

Advection
Causes of Frost

Strong radiation from ground drops temperature near ground to freezing or below.
Causes of Frost
Radiation – Less Likely on Cloudy or Windy Nights

Cloudy Night
- Clouds absorb outgoing radiation and re-radiate it back to ground

Windy Night
- Air mixes near surface with warmer air above, breaks up inversion
Causes of Frost
Advection – Cold Air Moves in From Somewhere Else
• Cold air drainage down slopes
• From another source region

Very hard to protect against, usually because of long duration

Source: WWW.Worldatlas.com
Kinds of Frost

White – Frost visible on plant
Deposition vs. Sublimation

Black – Temperature drops below freezing, but no frost visible on plant
Effects of Soils, Mulch and Snow

Soils

Soil type influences frost formation

Thermal diffusivity is controlling factor

Soils with high diffusivity less likely to have frost than those with low diffusivity
Effects of Soils, Mulch, and Snow

Soils

High diffusivity soils – Clay and loam
Packed or compacted soils

Low Diffusivity Soils – Peat
Sandy
Recently worked

WHY ? – IT’S THE AIR
Effects of Soils, Mulch, and Snow

Outgoing radiation decreases heat, but high diffusivity of soil allows rapid transfer to replace it.

Clay and loam soil

Little trapped air
Effects of Soils, Mulch, and Snow

Trapped air in soil retards heat transfer allowing area near ground to become cold.

Vertical temp profile

Wide soil particle spacing, lots of trapped air

Peat and recently worked soil
Effects of Soils, Mulch and Snow

Mulches: A two-edged sword

Can keep soil warmer, but air above can become very cold

You’ve seen it – mulch, freshly turned soil, & compost piles have frost while bare soil does not

Soil transfers heat to mulch, but trapped air in mulch retards heat transfer to surface
Effects of Soils, Mulch and Snow

Mulches – Implications

Can create a frost where one would not have occurred

Warmer, mulched soil encourages early planting

Plants protruding above mulch can freeze, same with freshly-turned soil

SO...Watch out if you plant early!
Effects of Soils, Mulch and Snow

Snow

Effects similar to mulch for fresh snow
Warm under snow, but bitterly cold at snow surface
Compacted snow is just cold
Plant damage due to snow load
Protecting Against Frost

Easier to protect against radiation frost than advection

Advection frost from down slope can also be protected against

Both of above of short duration

Advection frost from another source region difficult to protect against – long duration
Protecting Against Frost
Adding Heat

Commercially – blowers, wind machines, and helicopters

For the rest of us -
Plant frost-sensitive plants at top of slopes
Plant near house, fences, walls -- especially south facing
Water plants
Store solar heat in soil
Holiday lights and light bulbs
Protecting Against Frost
Reduce Heat Loss

Commercially – Fog and mist producers, remember smudge pots?

For the rest of us –
Turn on misters                Drain irrigation lines
Covers, frost cloth, blankets, etc    Frost caps
Wet Soil                       Wrap Pipes
Mulches if deep enough to cover plant – be sure to remove
Wait until Mar or Apr to prune frost-damaged/dead material
Planting Times
Plant Early and You’ll Plant Often!

Depends on -
• Date of last killing frost
• Soil type
• Micro-climates
• Type of plant
• An often forgotten variable - soil temperature

Plant cool season plants when soil temp warms to 35 – 40 F

Plant warm season plants when soil temp warms to 55 – 60 F

Get a soil thermometer or use the backside measurement
Planting Times

Average Date of Last Killing Frost Varies in our Area with Elevation:

<table>
<thead>
<tr>
<th>Elevation</th>
<th>Approximate Dates</th>
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</thead>
<tbody>
<tr>
<td>1000 Feet</td>
<td>April 15</td>
</tr>
<tr>
<td>2000 Feet</td>
<td>April 22</td>
</tr>
<tr>
<td>3000 Feet</td>
<td>April 30</td>
</tr>
<tr>
<td>4000 Feet</td>
<td>May 07</td>
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</tbody>
</table>

Placerville:
Last Killing Frost is about April 30
First Killing Frost is about October 15

*Remember Terrain can cause these dates to vary
VII. Making Your Own Weather Forecast

Suggested Instruments

• Siting
• Make A Simple Forecast
Suggested Instruments

Barometer
Max/Min Thermometer
Anemometer or at least a Wind Vane
Rain Gauge
Proper Siting

Barometer

In house OK, can calibrate and adjust for altitude if accurate sea level reading desired

Calibration not necessary if just following trend
Proper Siting

Min/Max Thermometer

Best in slatted shelter in large grass area

Otherwise in area out of direct sun with free air flow

Not on house, walls or fences

About 4-5 feet above ground level
Proper Siting

**Anemometer/Wind Vane**

In open area clear of buildings, trees, fences, cliffs, etc

Preferably 10-12 feet above ground

**Rain gauge**

In open

Away from buildings, trees, fences
Making a Simple Forecast

Using the barometer

Using the wind

Watching the clouds
Using The Barometer

Low Pressure Associated With Bad Weather
High Pressure Associated With Good Weather

Rapidly rising
Suggests fair weather

Rapidly falling
suggests stormy weather
Using the Barometer

Watch Out for Diurnal Variation

Pressure

Early morning

Late afternoon
Using the Barometer

Rapid rise after cold front passage
Quick clearing
Radiational cooling
Possible frost

Rapid rise after cold front passage, with:
Quick clearing
Strong north wind
Strong cold air advection
Possible sustained freeze – arctic express
Sustained southeast winds suggest storm and rain
Switch in winds from southeast or southwest to north or northwest indicate end of rain, clearing, cooling
Winds at night, no radiational frost
Watching The Clouds

Lowering clouds – high to middle to low suggest approaching storm and rain

Clearing in late afternoon or early evening suggest possible morning frost

Clouds at night – no radiation frost.
Thank You!

Any Questions?
UCCE Master Gardeners of El Dorado County