UCCE
Master Gardeners of
El Dorado County
Present

HEALTHY ENVIRONMENTS

Master Gardener
UNIVERSITY OF CALIFORNIA
COOPERATIVE EXTENSION

University *of* California
Agriculture and Natural Resources

Making a Difference for California

HEALTHY ENVIRONMENTS

Gardening in the Foothills Environment

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El Dorado County

Making a Difference for California

The Earth is Not A Toy

HEALTHY ENVIRONMENTS

University *of* California
Agriculture and Natural Resources

Making a Difference for California

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

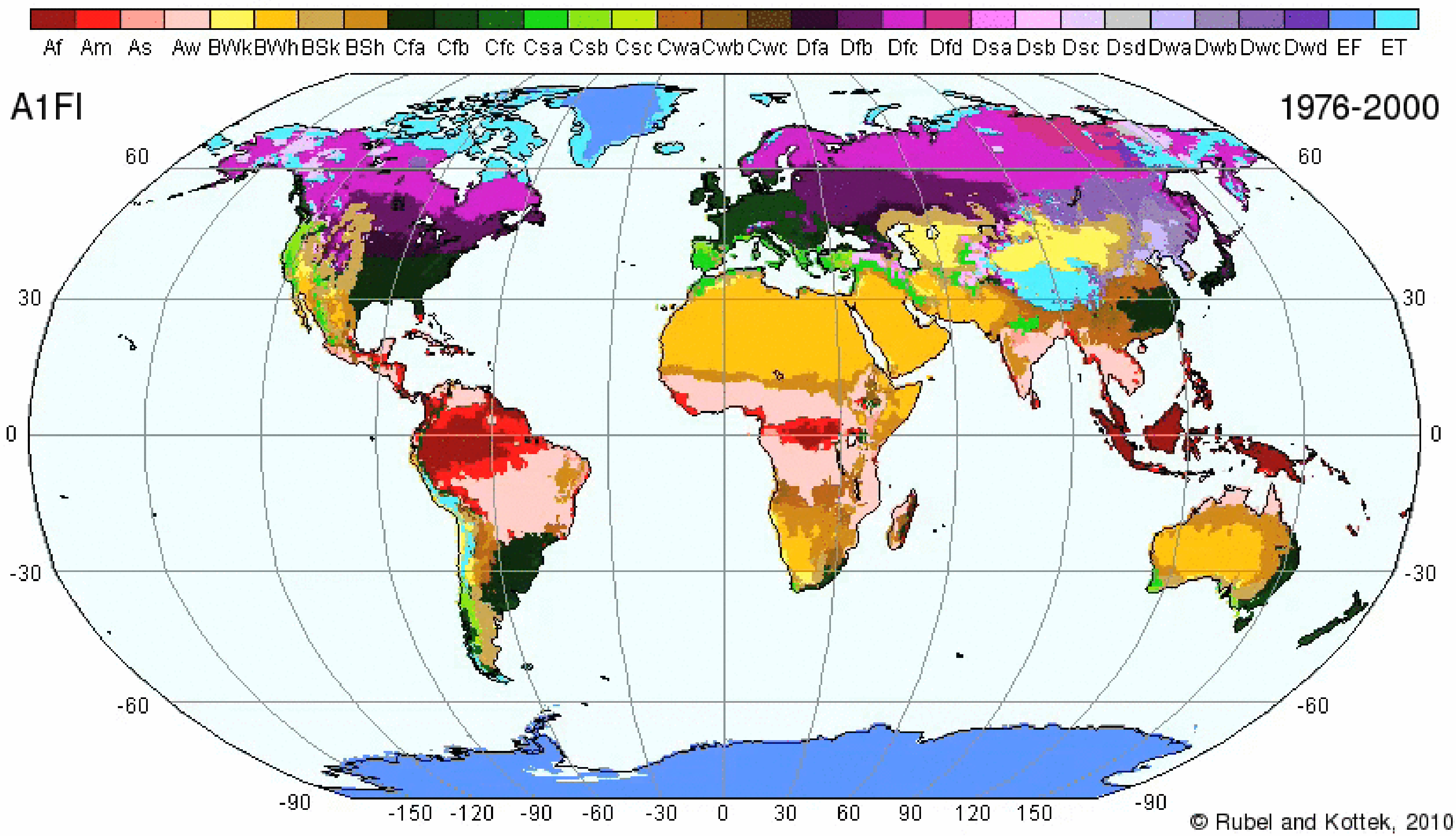
•Terrain and Elevation

•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

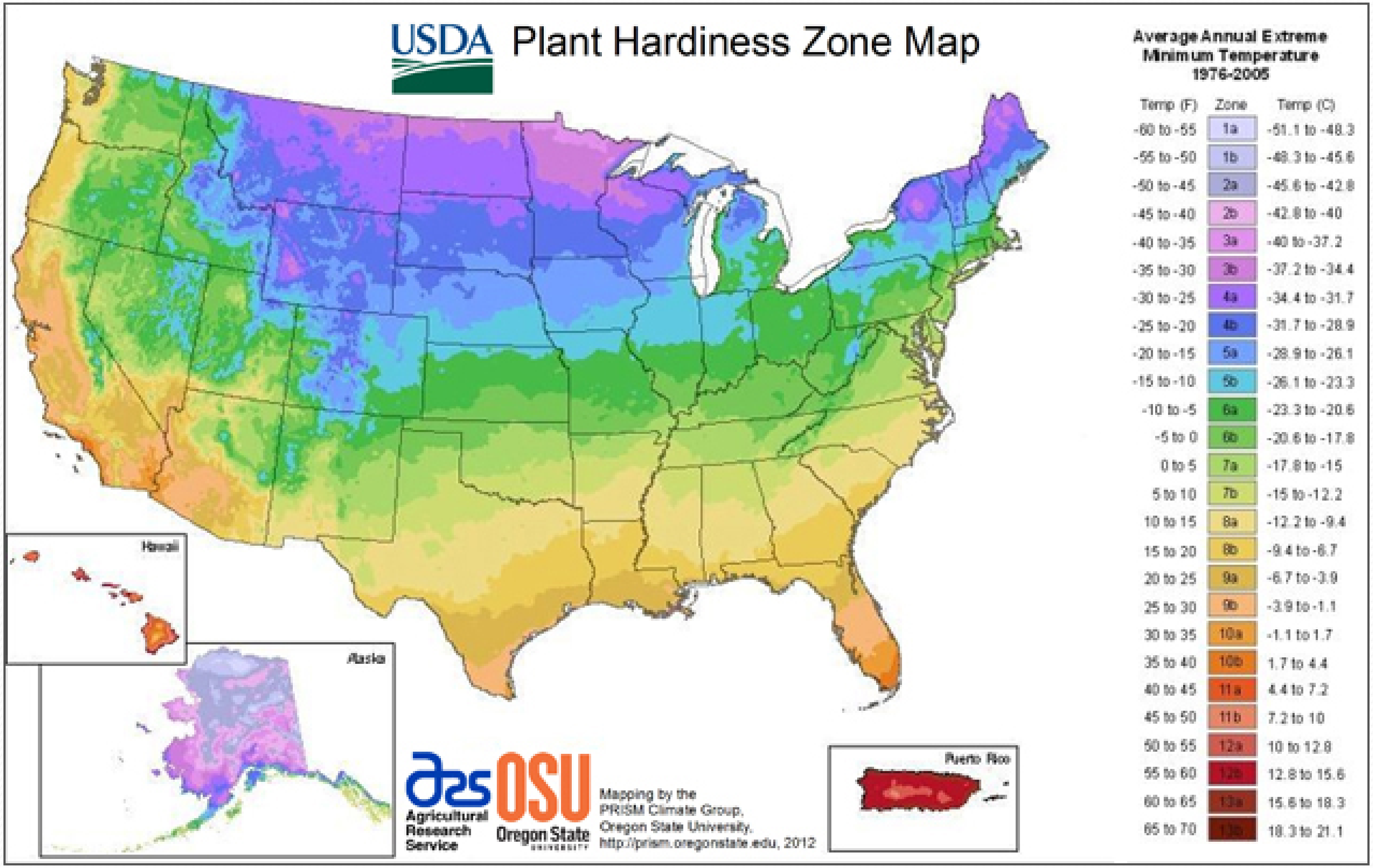
Divides country into 26 Zones

Zones based on lowest winter temperature

Plants categorized into zones based on lowest winter temperature they can survive

USDA Hardiness Zones

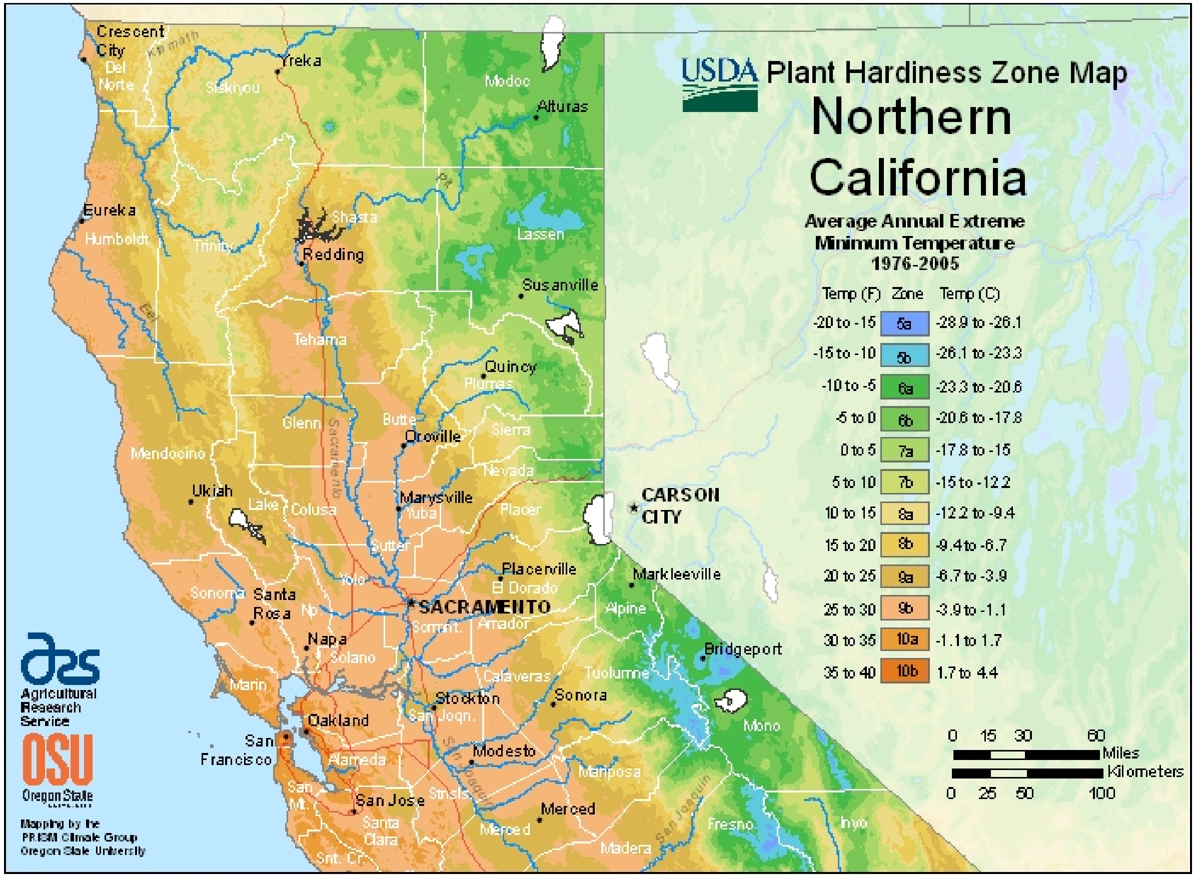
Entire US



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

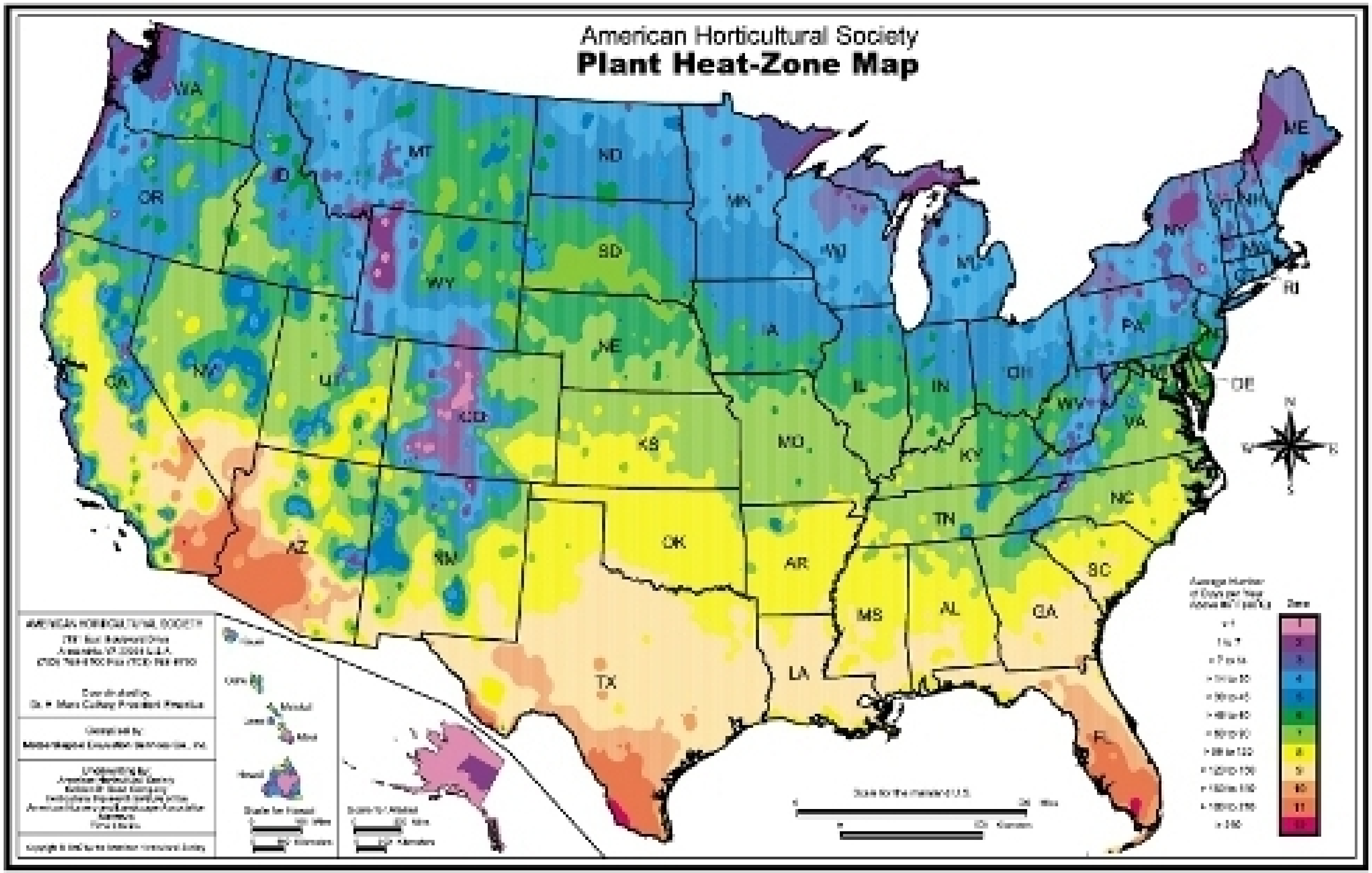
Zones based on plant adaptability to summer heat

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

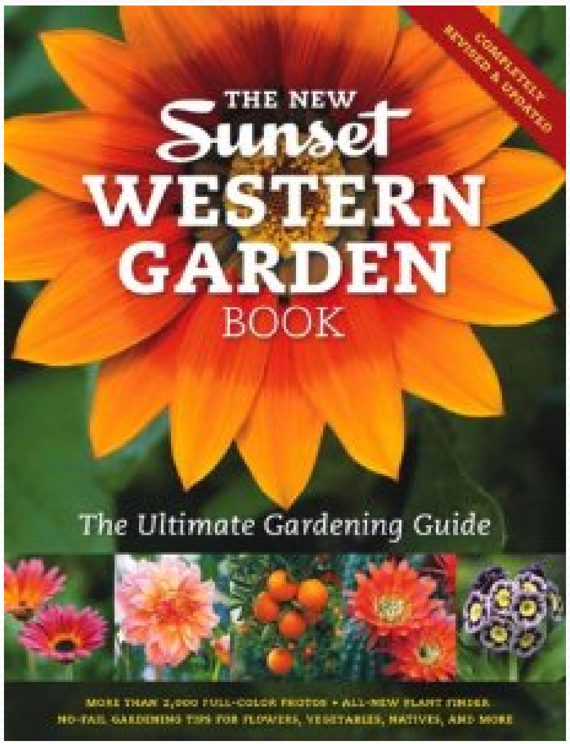
91-120 Days When Av Temp
Is Above 86 F

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

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?

	USDA	Sunset Western
Cameron Park	**9A** 20-25 F	**7** 26-35 F
Pollock Pines	**8B** 15-20 F	**1A** 0-11 F
		3B 19-29 F

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

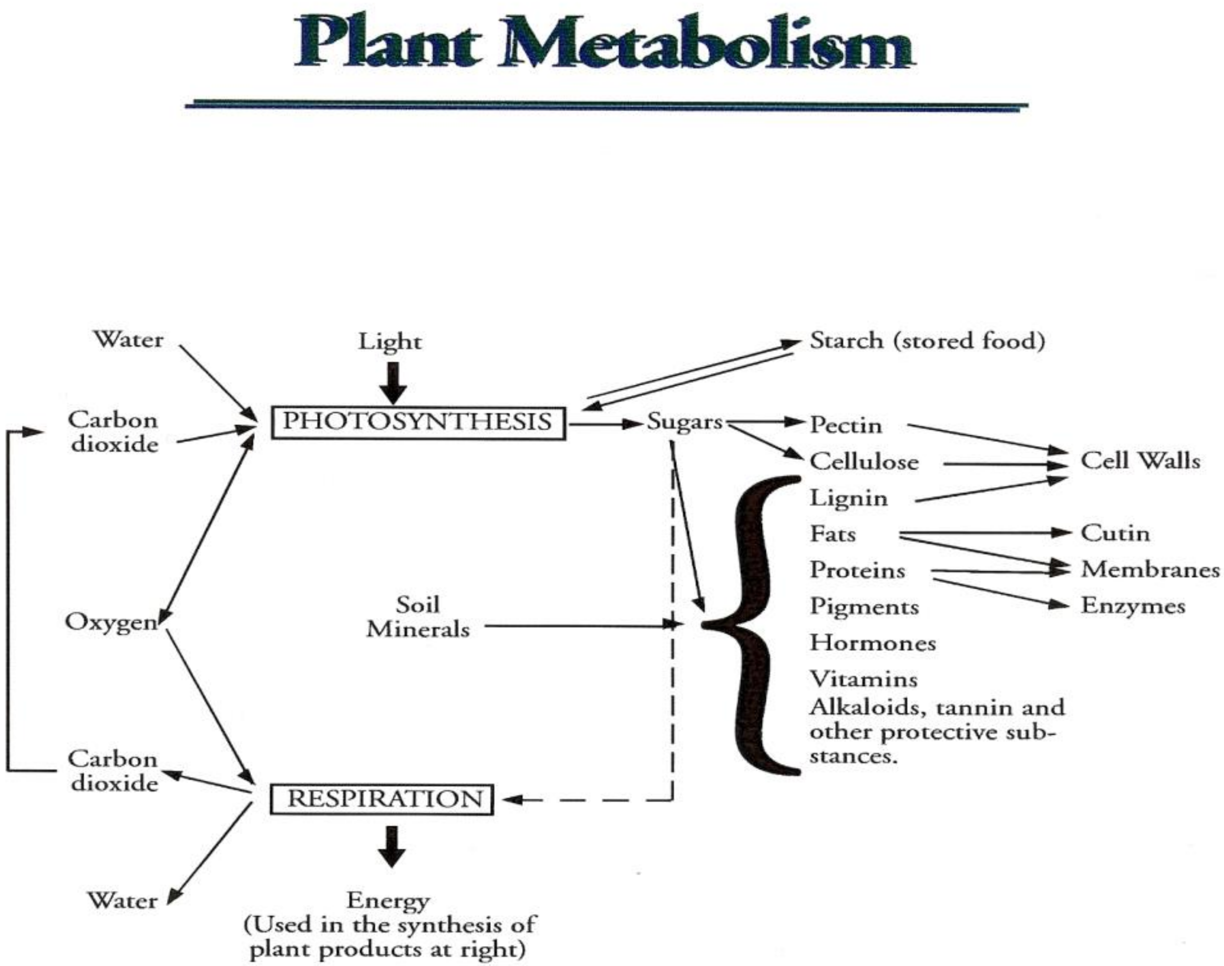
Photosynthesis

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

Photosynthesis

Respiration

Photosynthesis



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?

Light Intensity

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

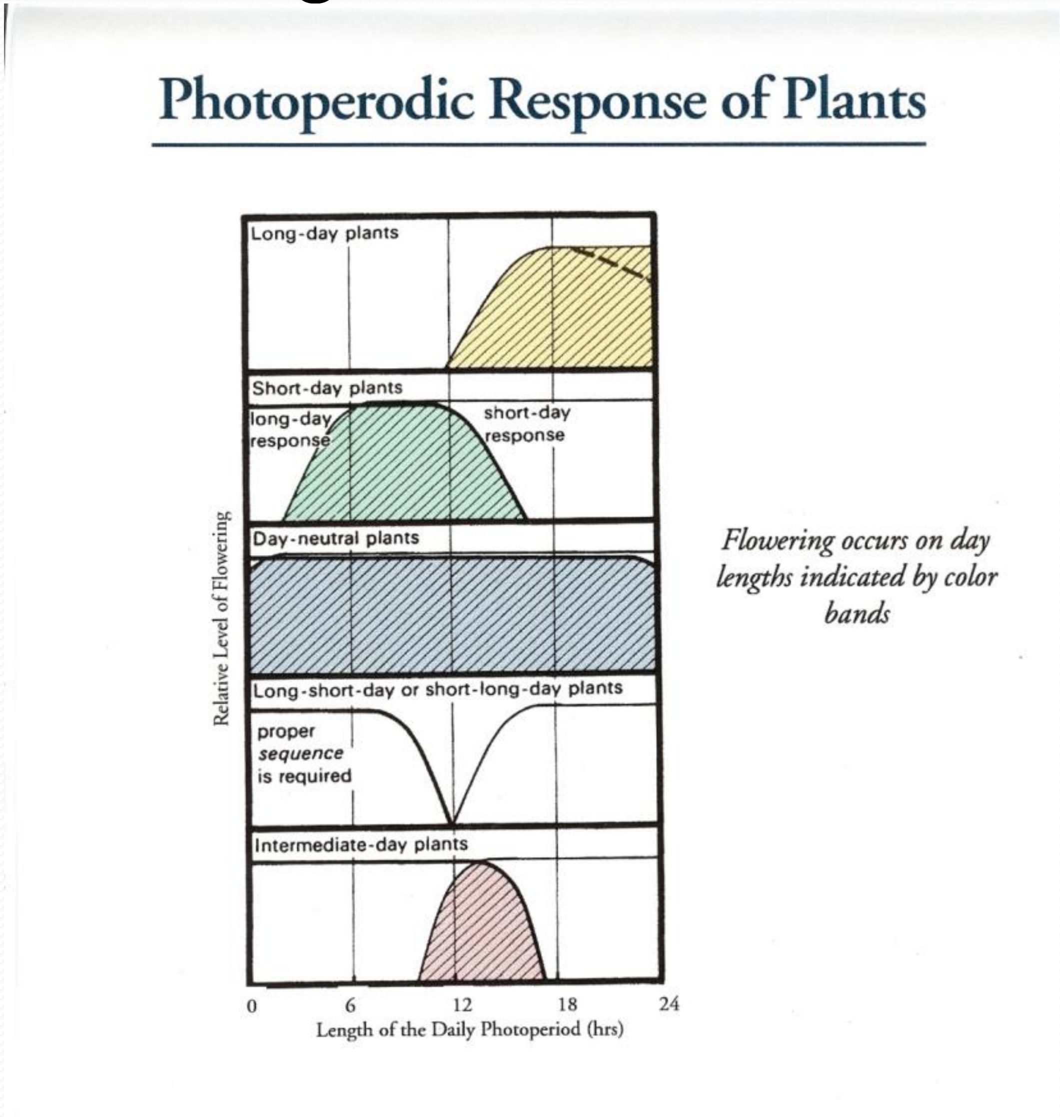
Light Duration

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 <u>shorter</u> than a critical length, the plant is a <u>Long</u> <u>Day</u> plant

If the plant doesn't bloom because day length is <u>longer</u> than a critical length, the plant is a <u>Shor</u>t <u>Day</u> plant

Light Duration



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?

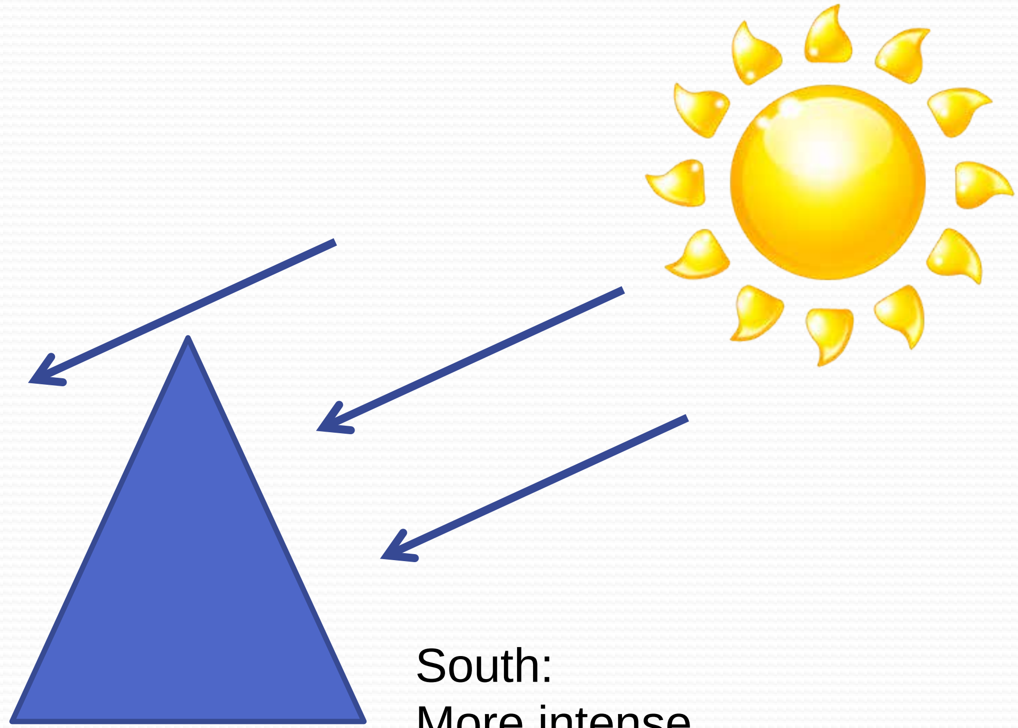
Factors Affecting Duration and Intensity

Natural Factors Affecting Duration and Intensity

Latitude
Elevation
Slope

Factors Affecting Duration and Intensity

Slope – North vs. South

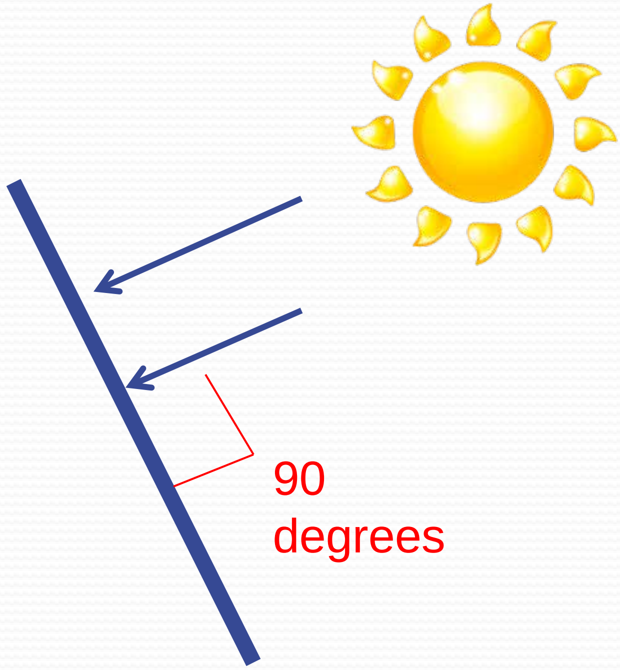


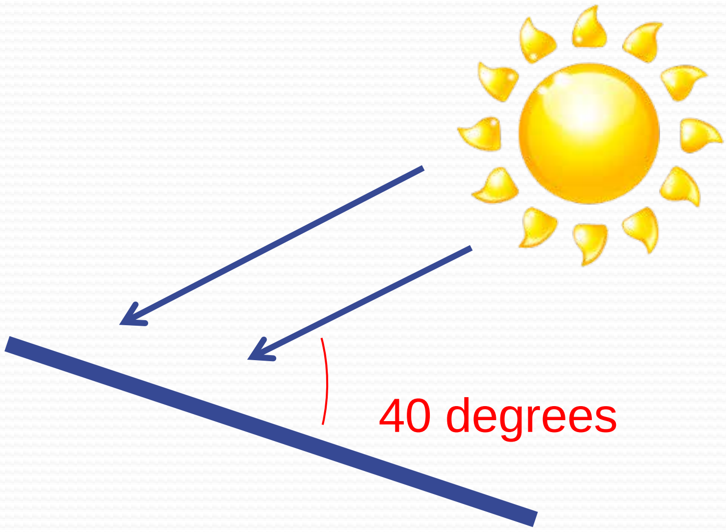
North:
Less intense,
Shorter duration

South:
More intense,
Longer duration

Factors Affecting Duration and Intensity

Slope – Steep vs Shallow





Steep:
More perpendicular,
More intense

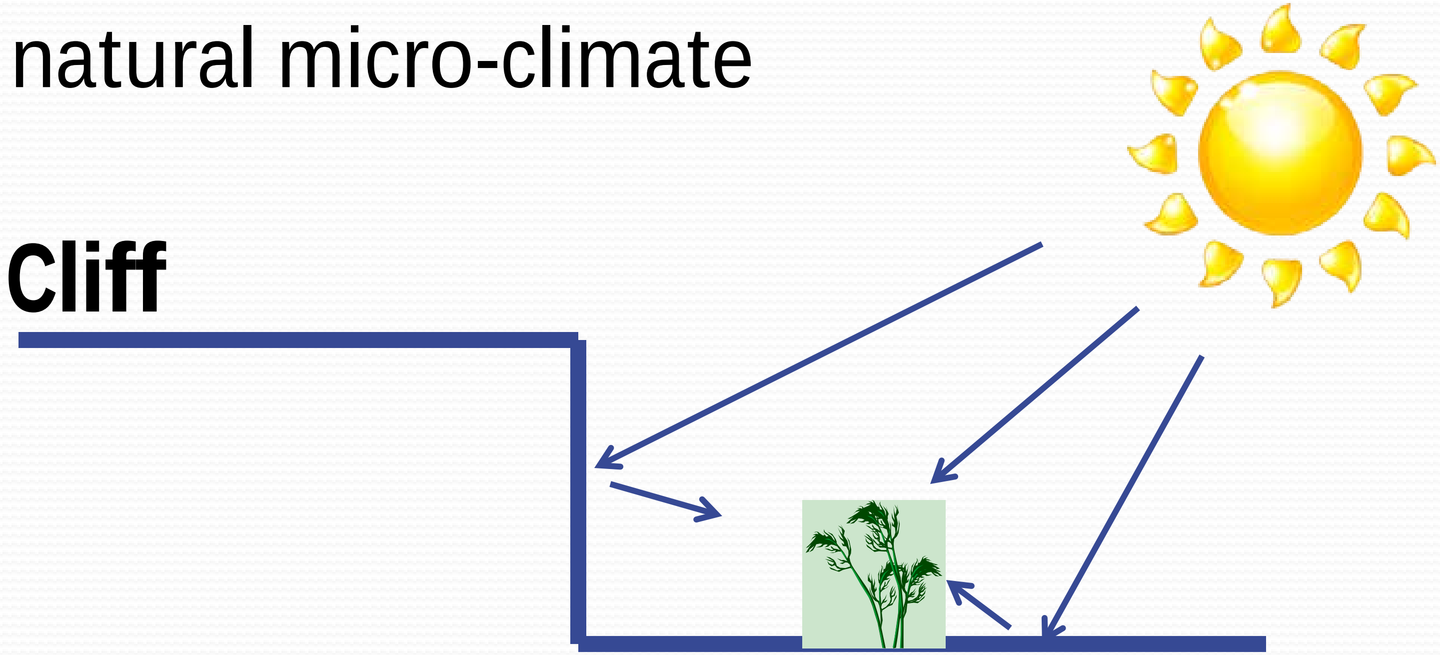
Shallow:
Shallow grazing angle,
Less intense

Factors Affecting Duration and Intensity

Plant receives both direct and reflected light:

Increasing intensity

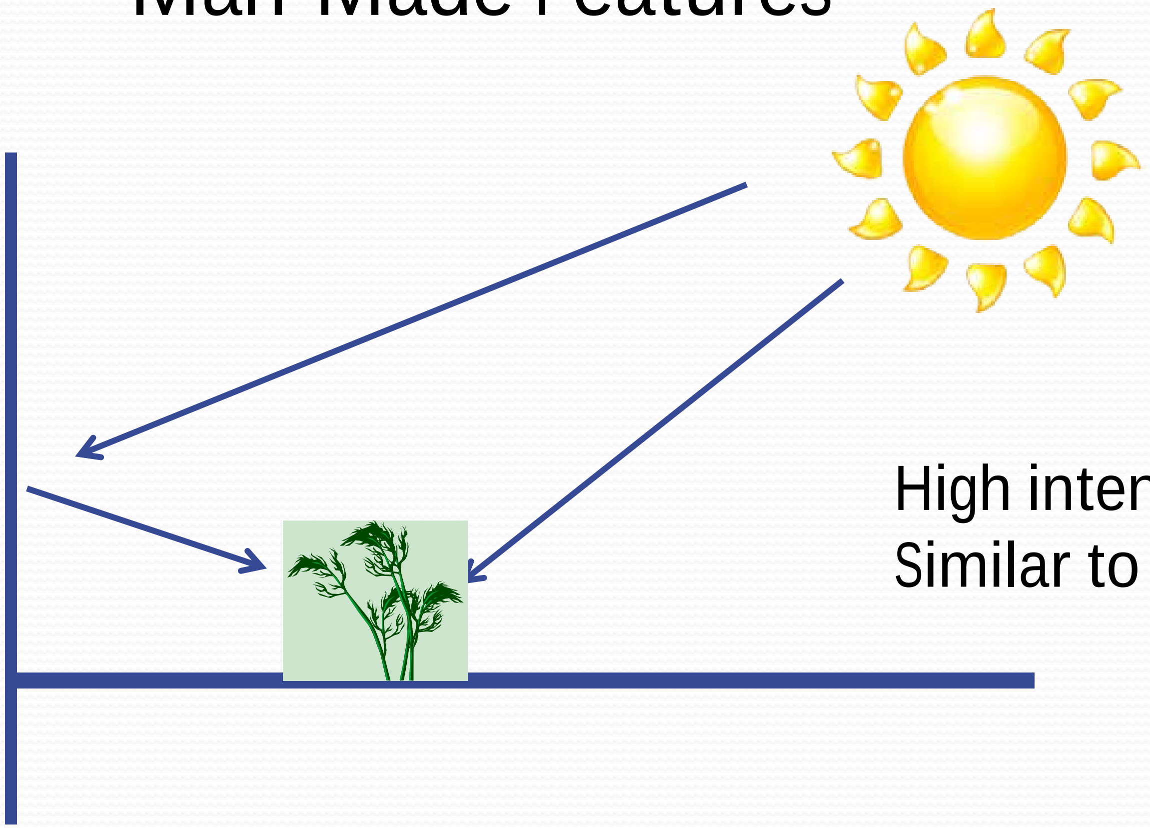
A natural micro-climate



Factors Affecting Duration and Intensity

Man-Made Features

Fence or wall

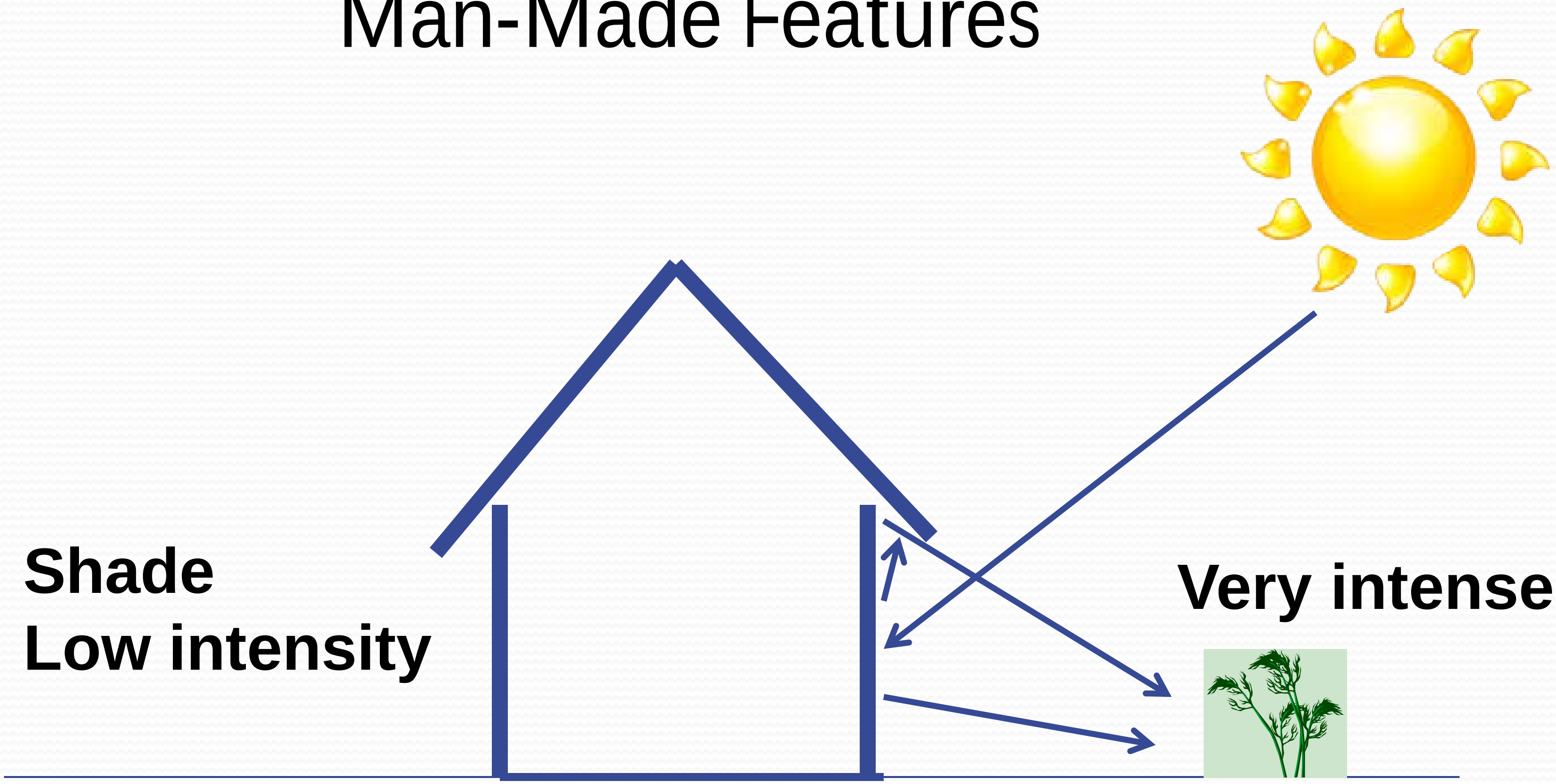


High intensity:
Similar to cliff

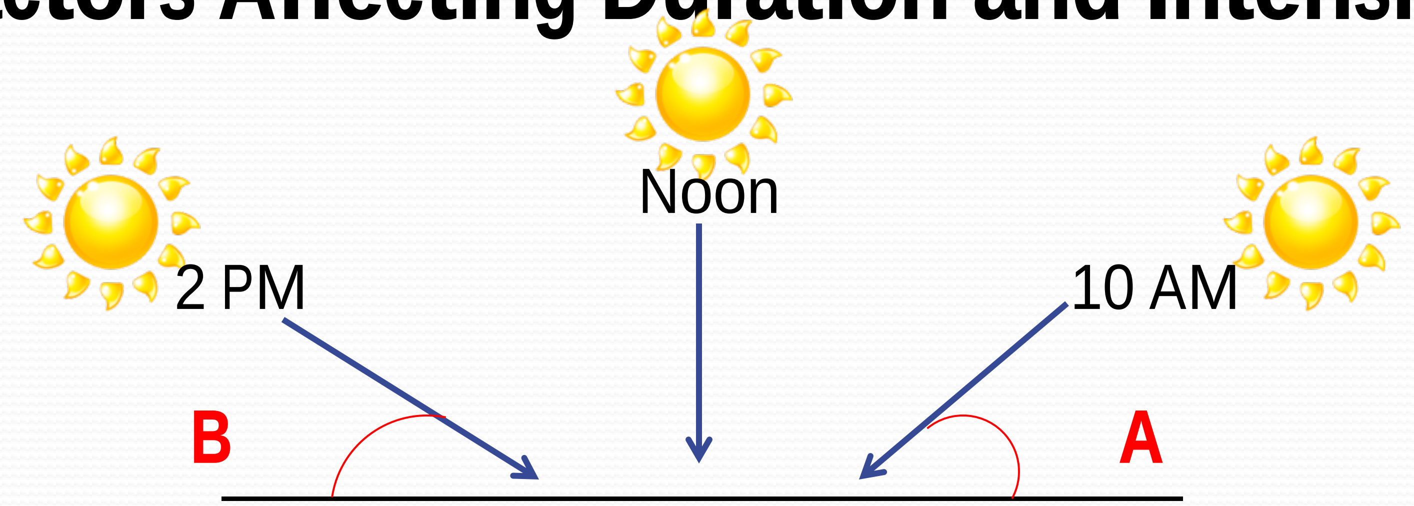
Shade:
Low intensity

Factors Affecting Duration and Intensity

Man-Made Features



Factors Affecting Duration and Intensity



A = B

Morning vs. Afternoon Intensity

III. Effects of Temperature on Plant Growth

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

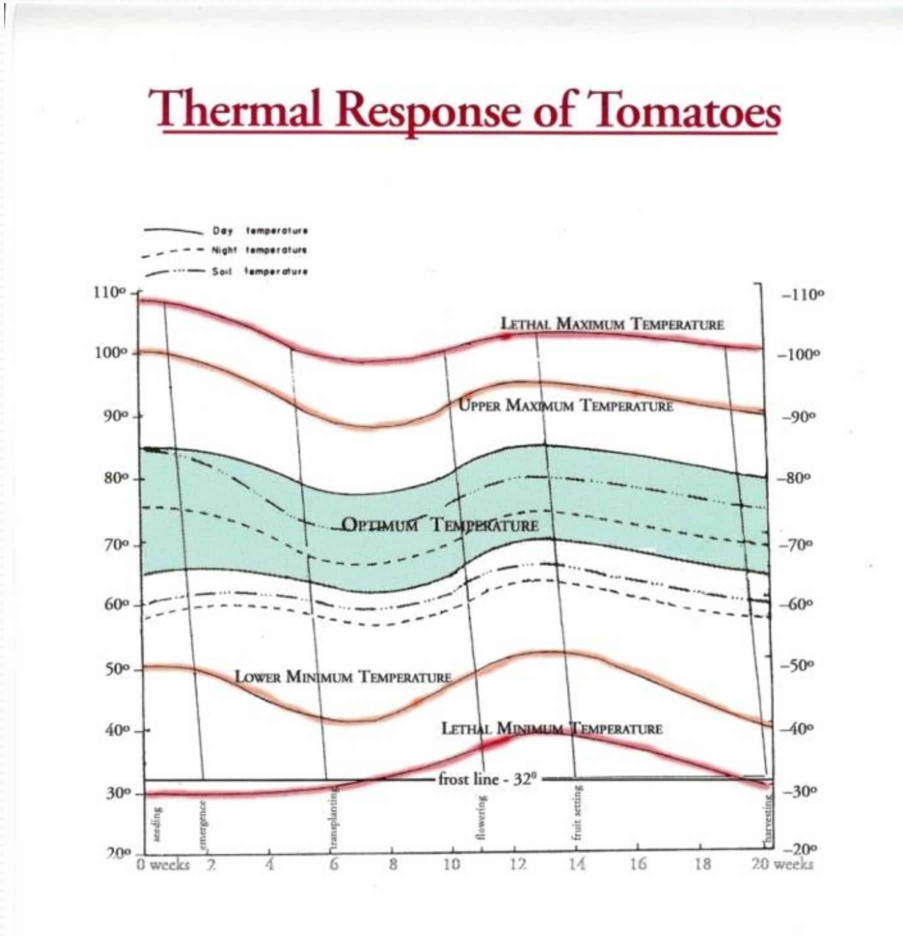
Temperature Ranges For Plant Growth

Ranges: Optimal
Upper Maximum
Lethal Maximum
Lower Minimum
Lethal Minimum

Ranges Vary by Plant

Temperature Ranges For Plant Growth

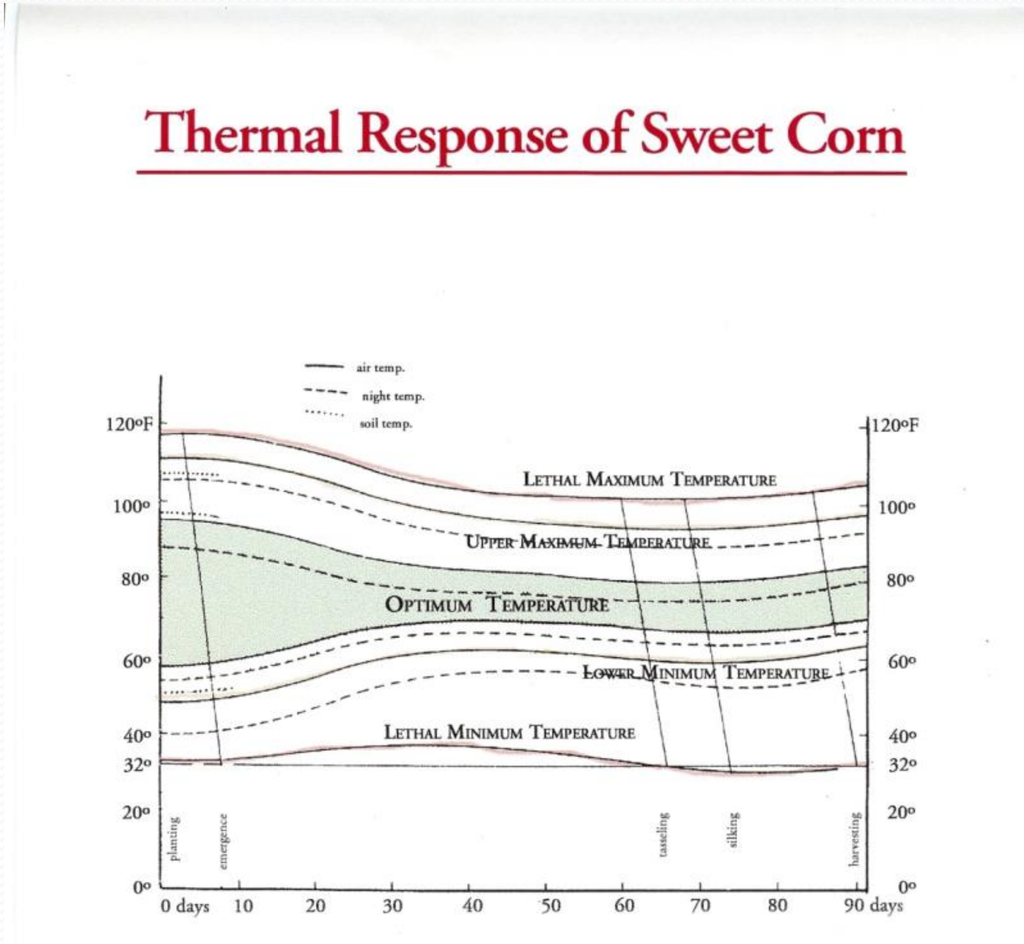
Thermal Response of Tomatoes Model



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

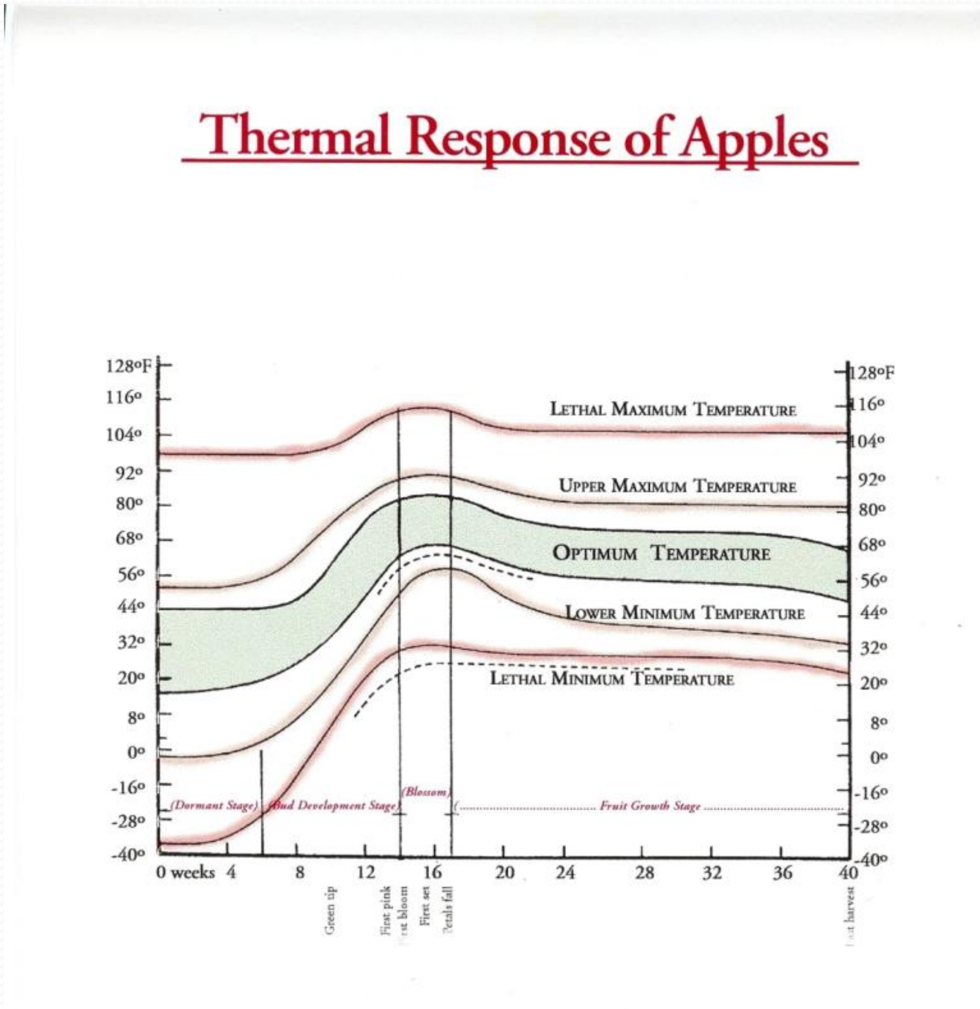
An accumulation of hours at or below a given temperature to enhance or initiate:

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:

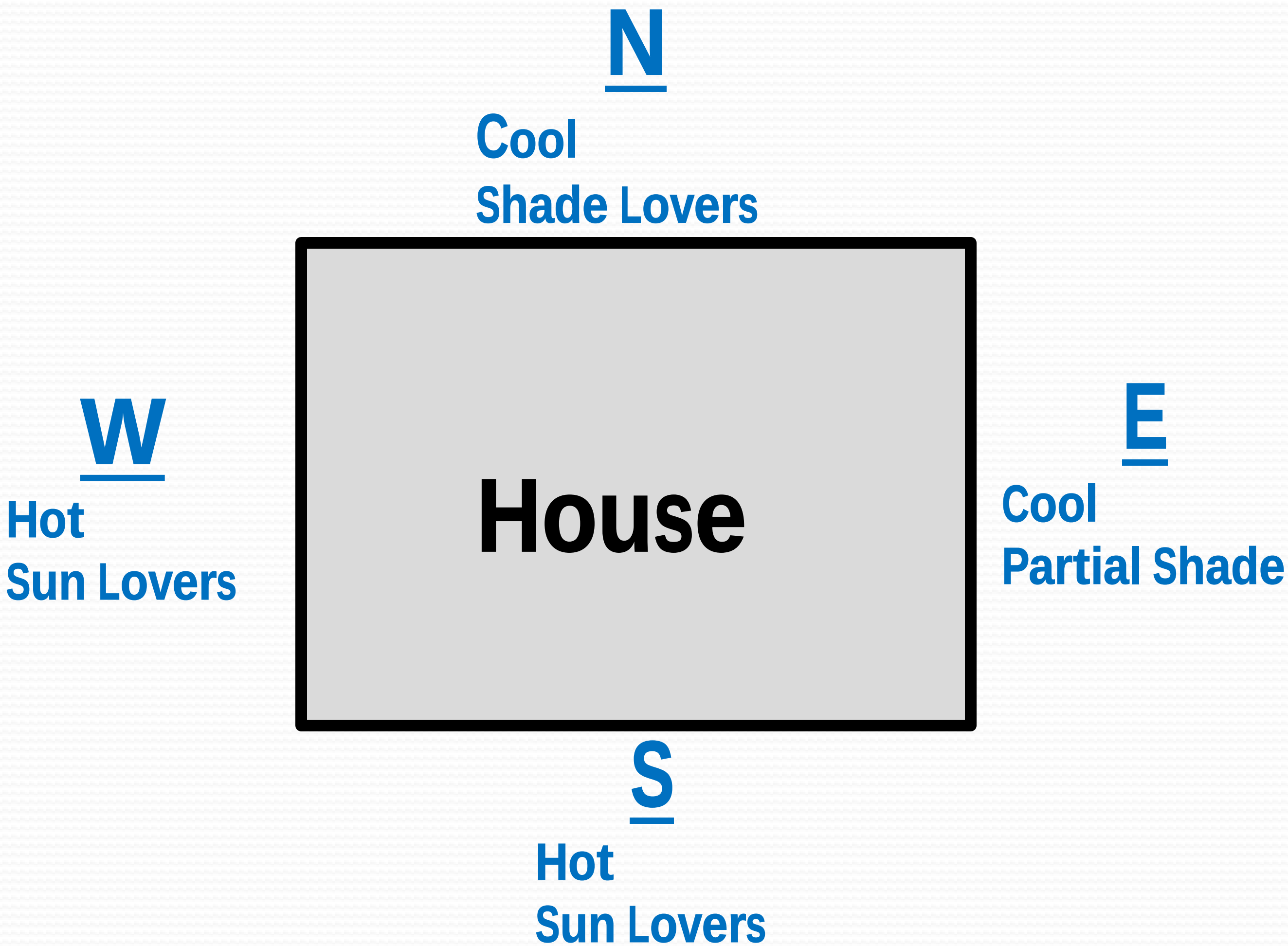
Reduction of growth, and finally cessation

Cessation of chlorophyll formation

Death of plant

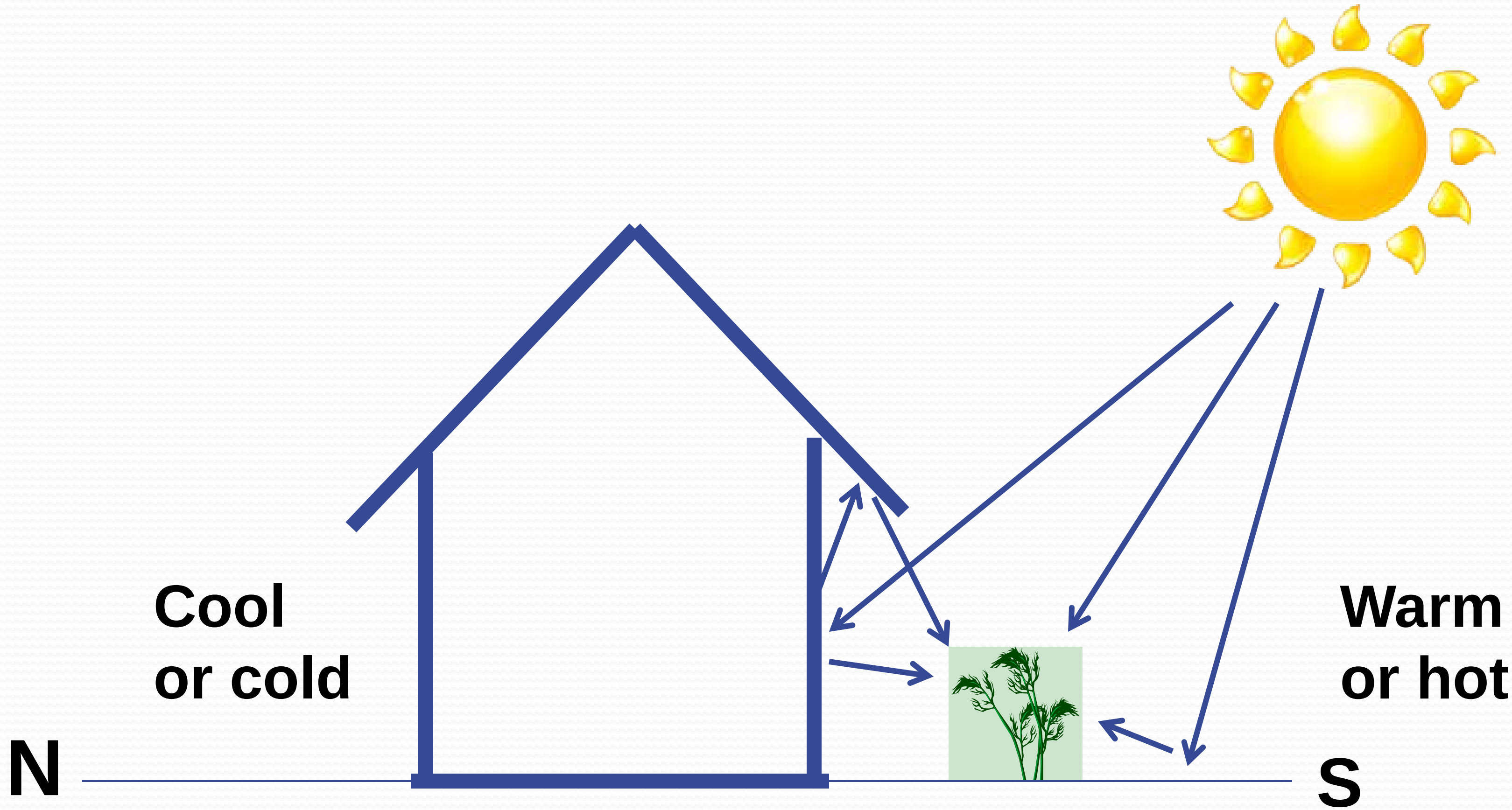
Factors Affecting Temperature

Location With Respect to House



Factors Affecting Temperature

Location With Respect to House



Factors Affecting Temperature

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

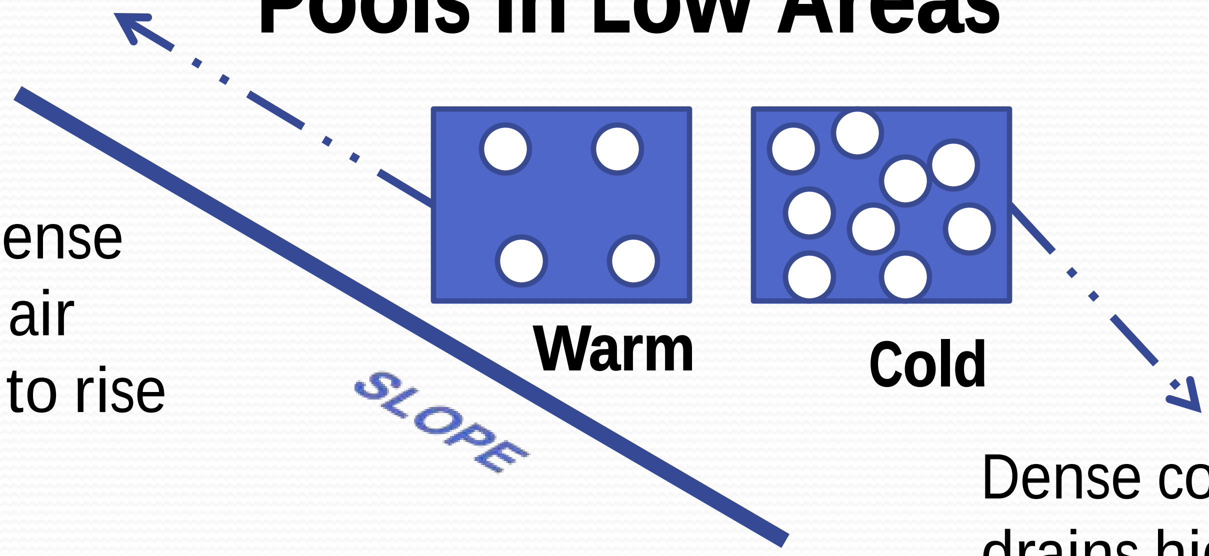
IV. Terrain Effects

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

Characteristics of Cold Air

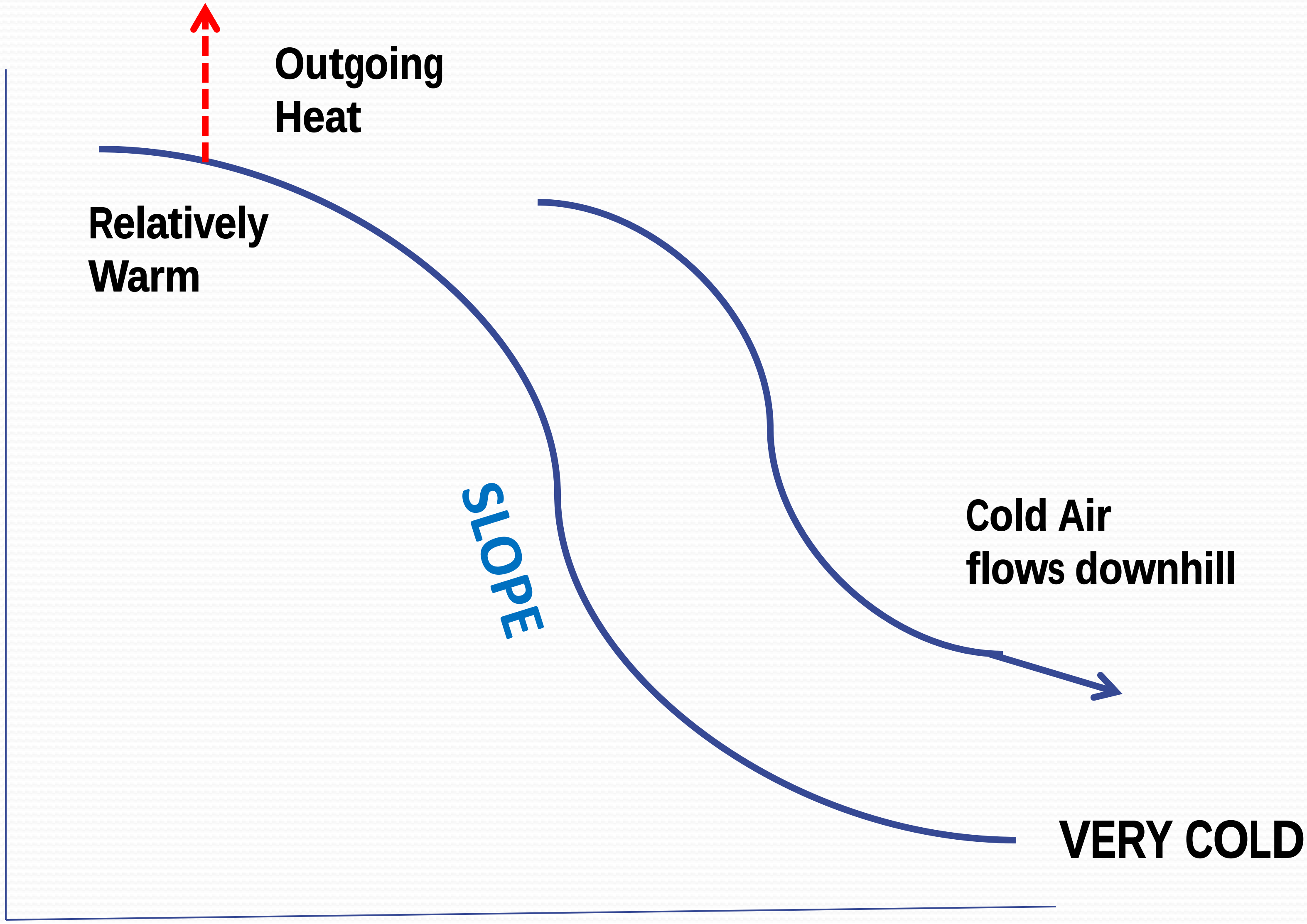
Dense Cold Air Drains High to Low Pools in Low Areas

Less dense warm air tends to rise



Dense cold air drains high to low pools in low areas

Slopes vs. Valleys - Cold Air Drainage

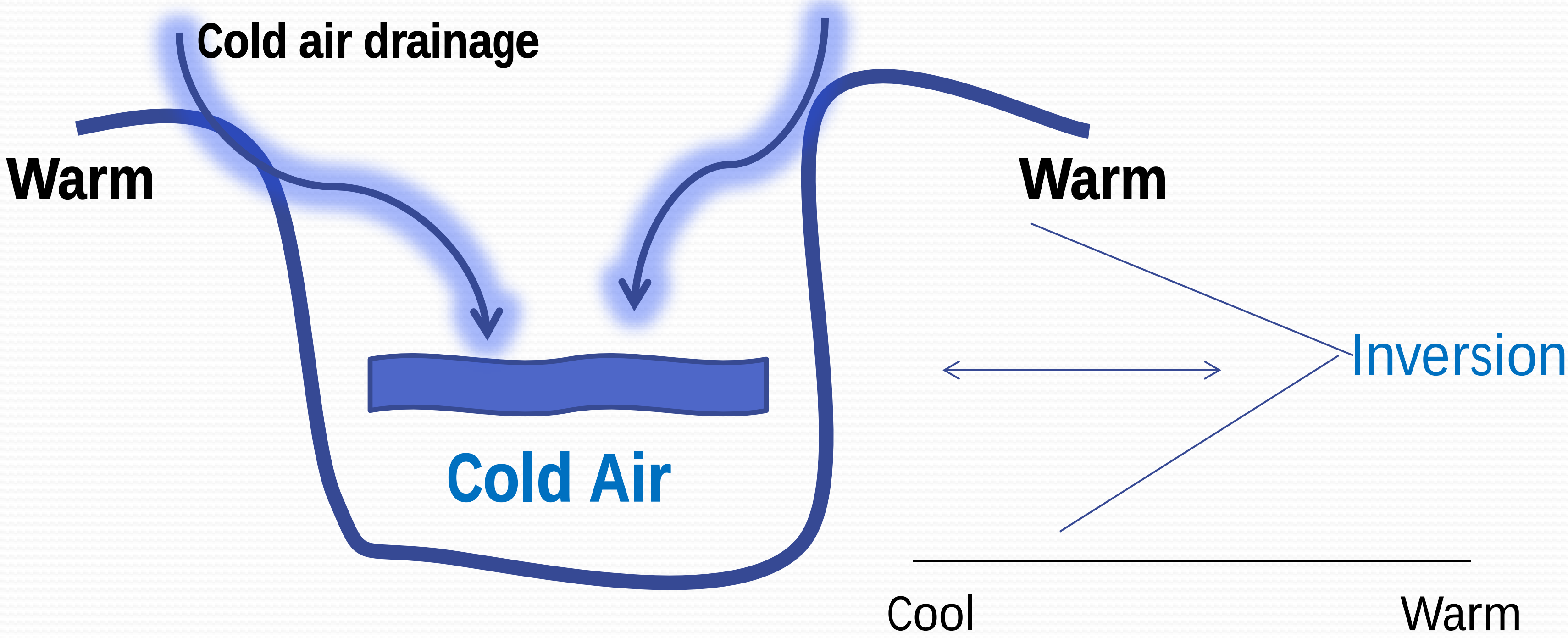


Slopes vs. Valleys – Cold Air Drainage

Cold air pools in valleys

Significant affect on growing season

Persistence of fog and low clouds



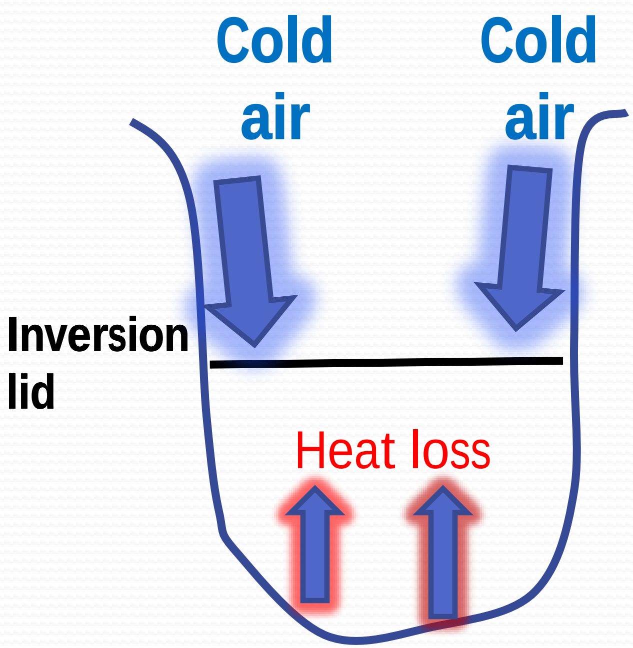
Slopes vs. Valleys

Implications:

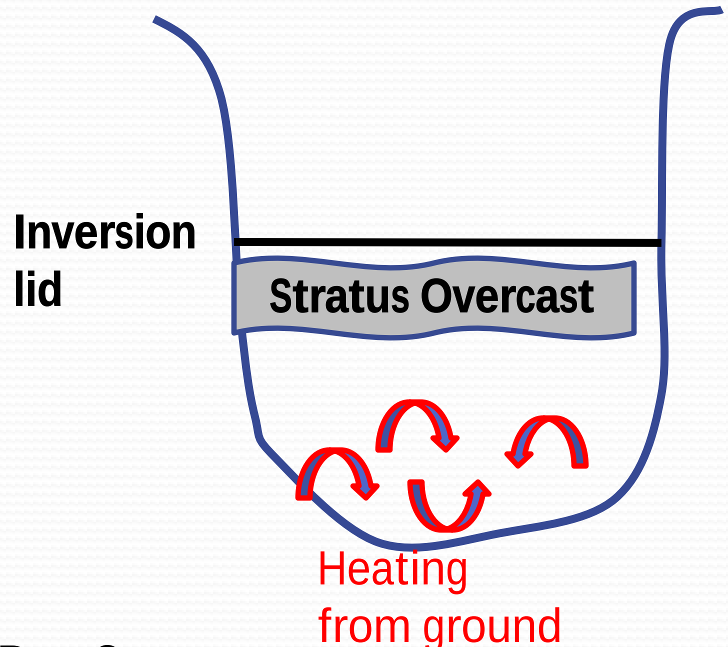
Crop Location
Fruit Trees
House Construction

Slopes vs. Valleys

Sacramento Valley

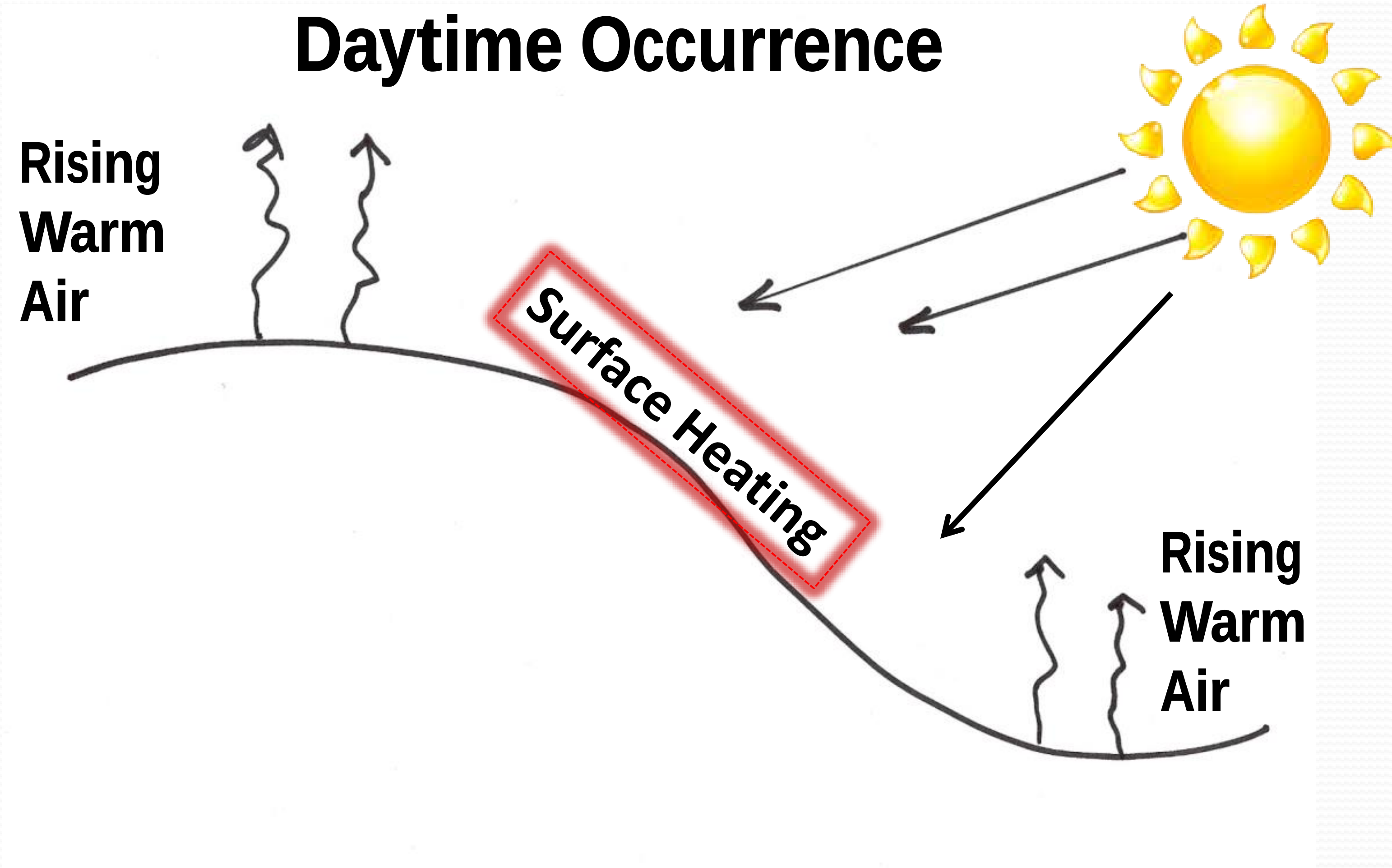


Day 1 or 2
Fog Forms



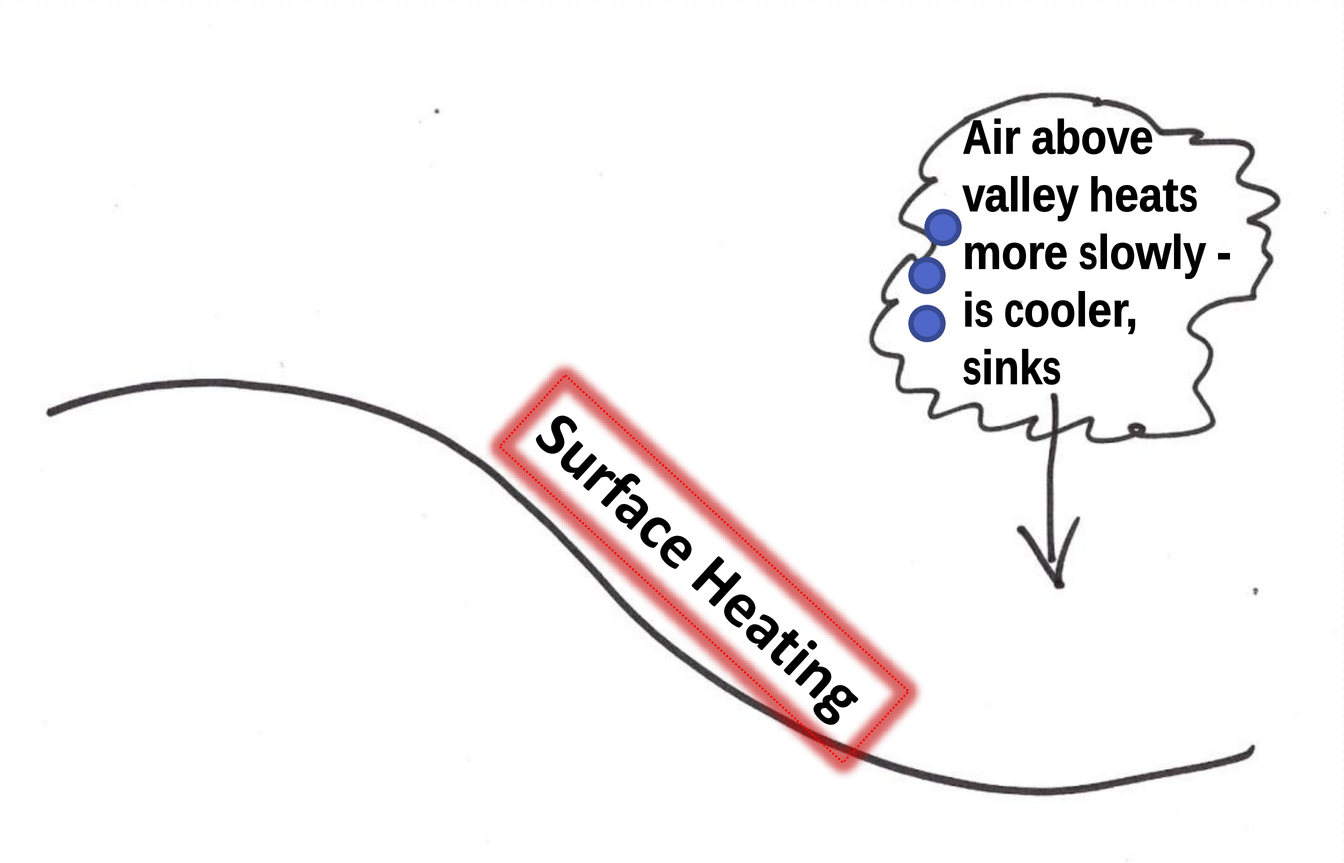
Day 2 or more
Mixing Below
Fog Lifts
Low overcast at inversion base

Upslope (Valley) Wind



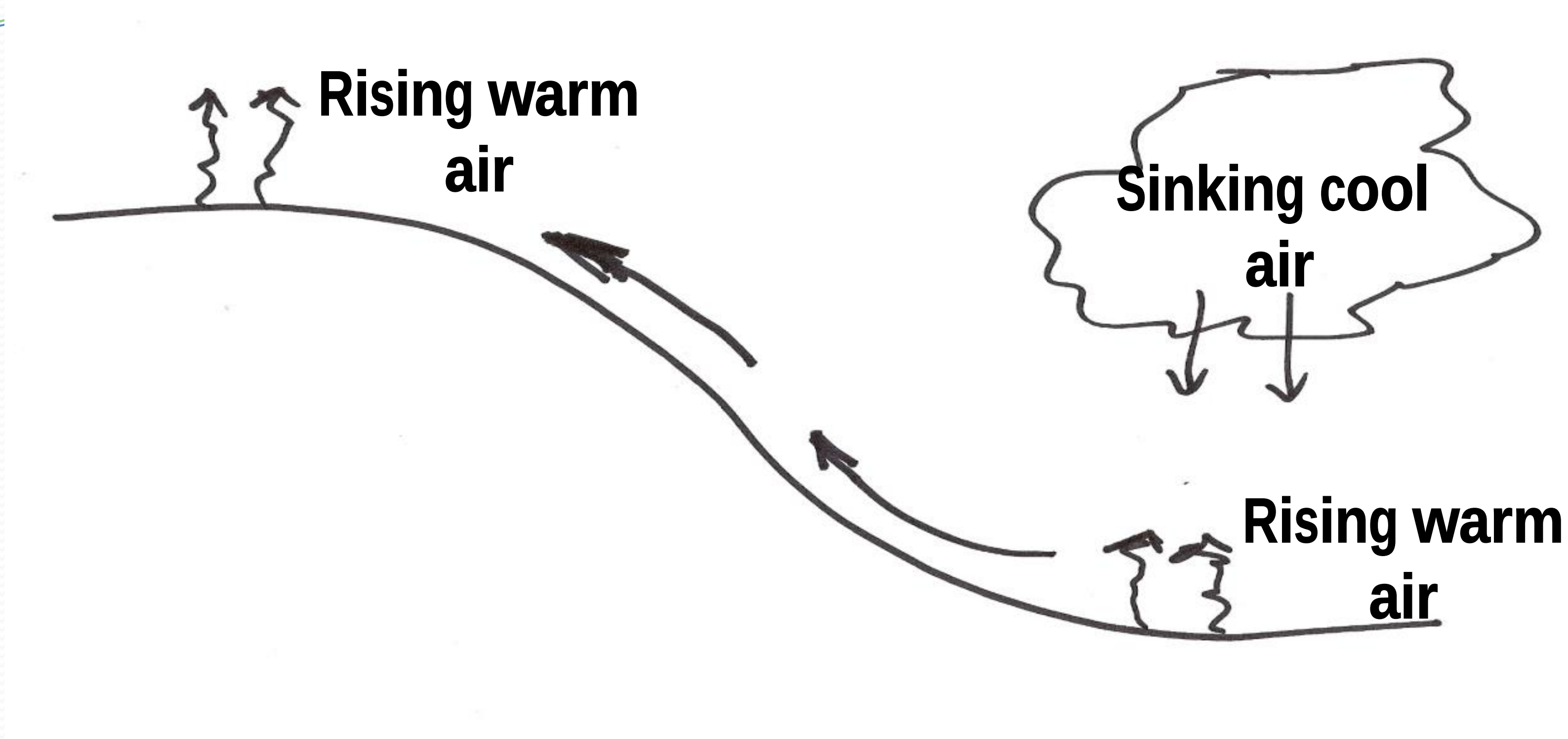
Heating of the Ground Causes Rising Air

Upslope (Valley) Wind



Ground surfaces heat rapidly

Upslope (Valley) Wind

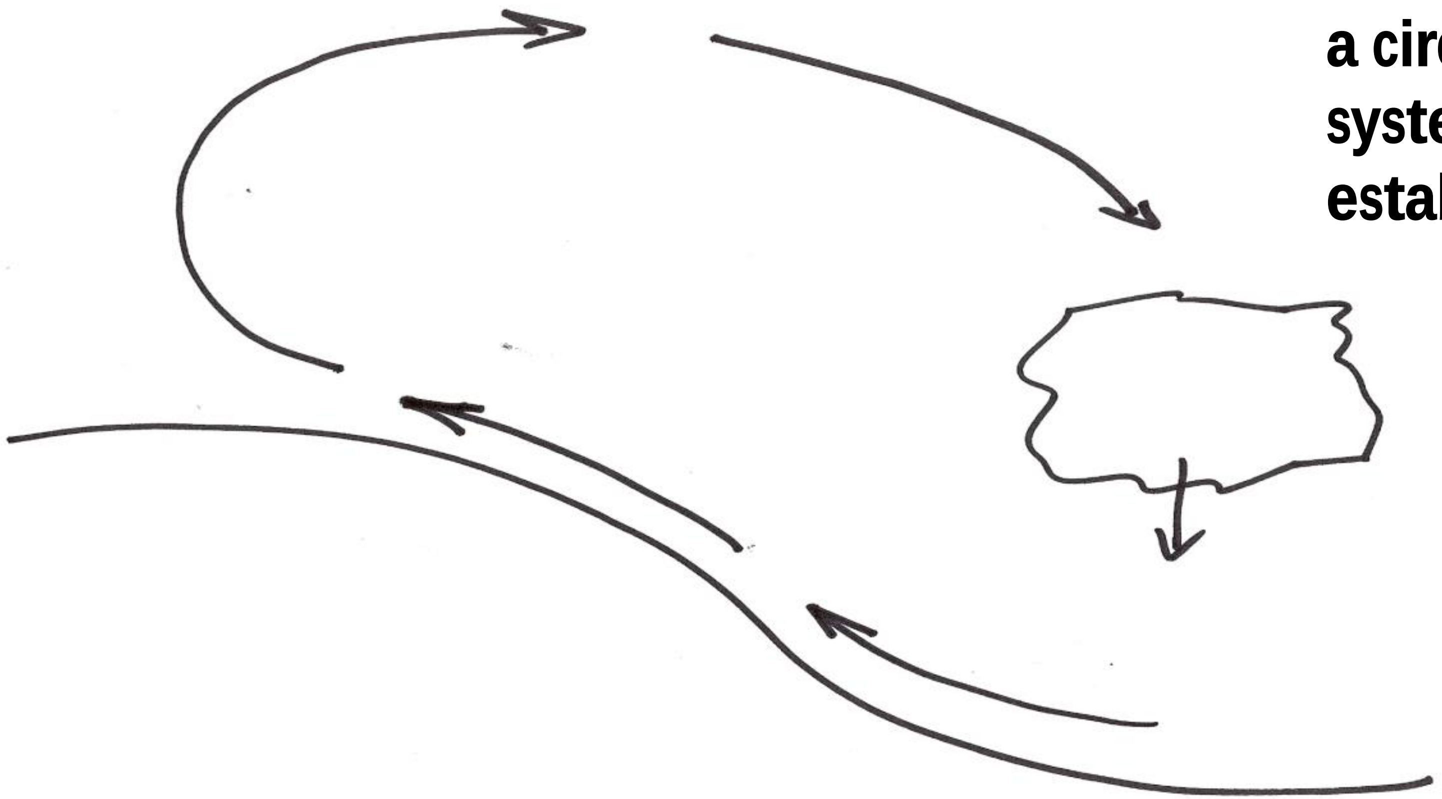


Sinking cool air over valley leaves no place for rising warm air to go

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

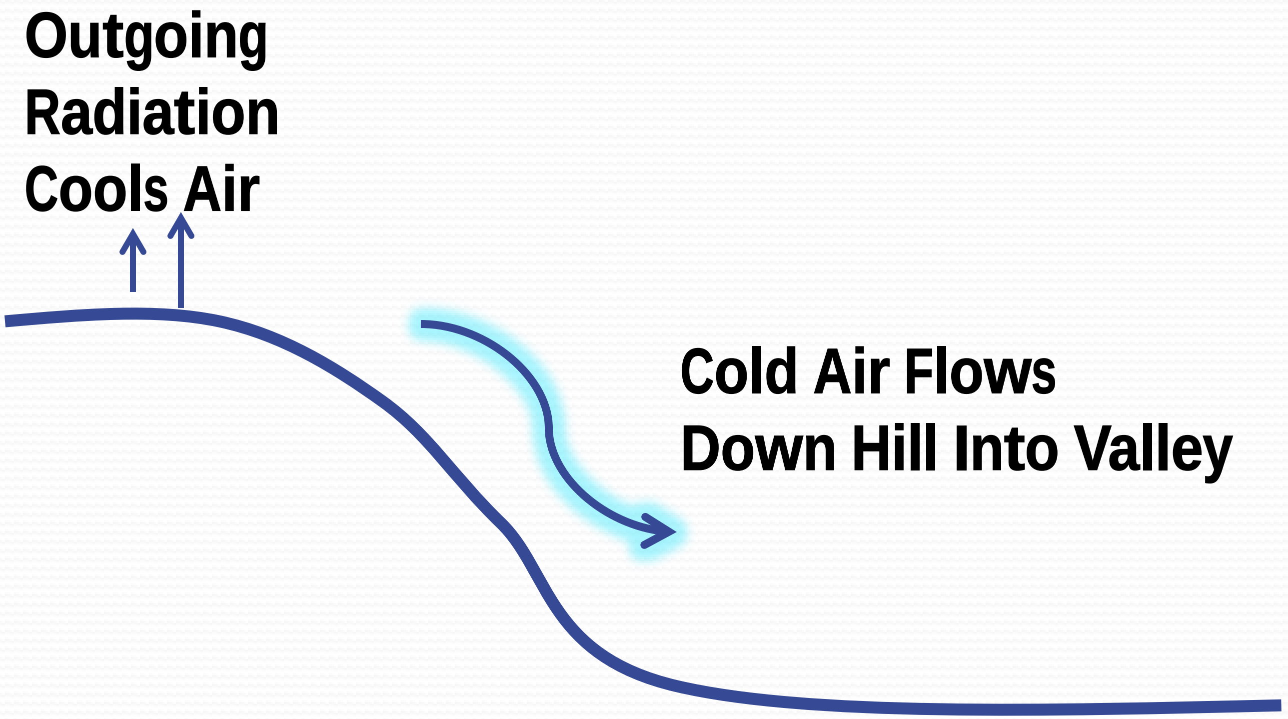
Upslope (Valley) Wind

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

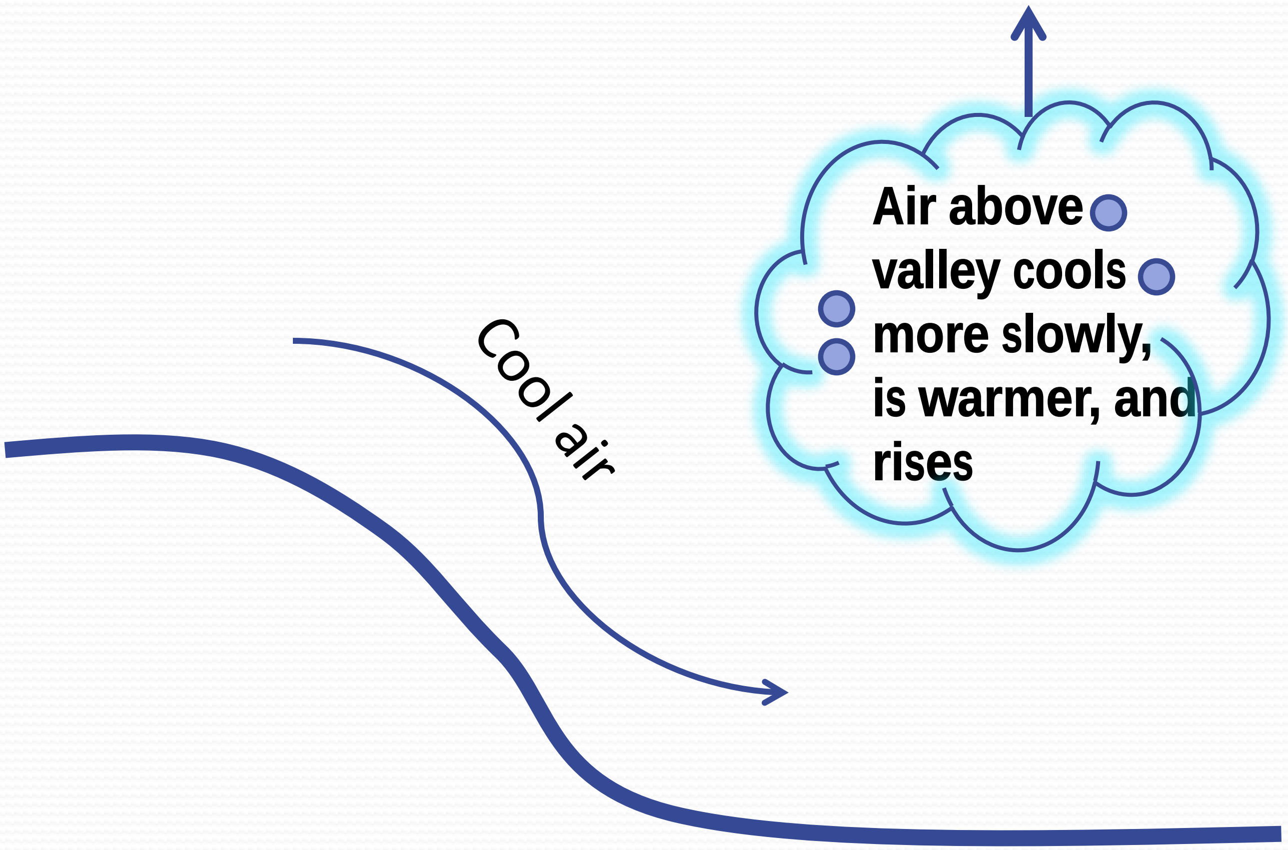
Protection Strategies: Blocking
Misting
Relocation

Down slope (Mountain) Wind

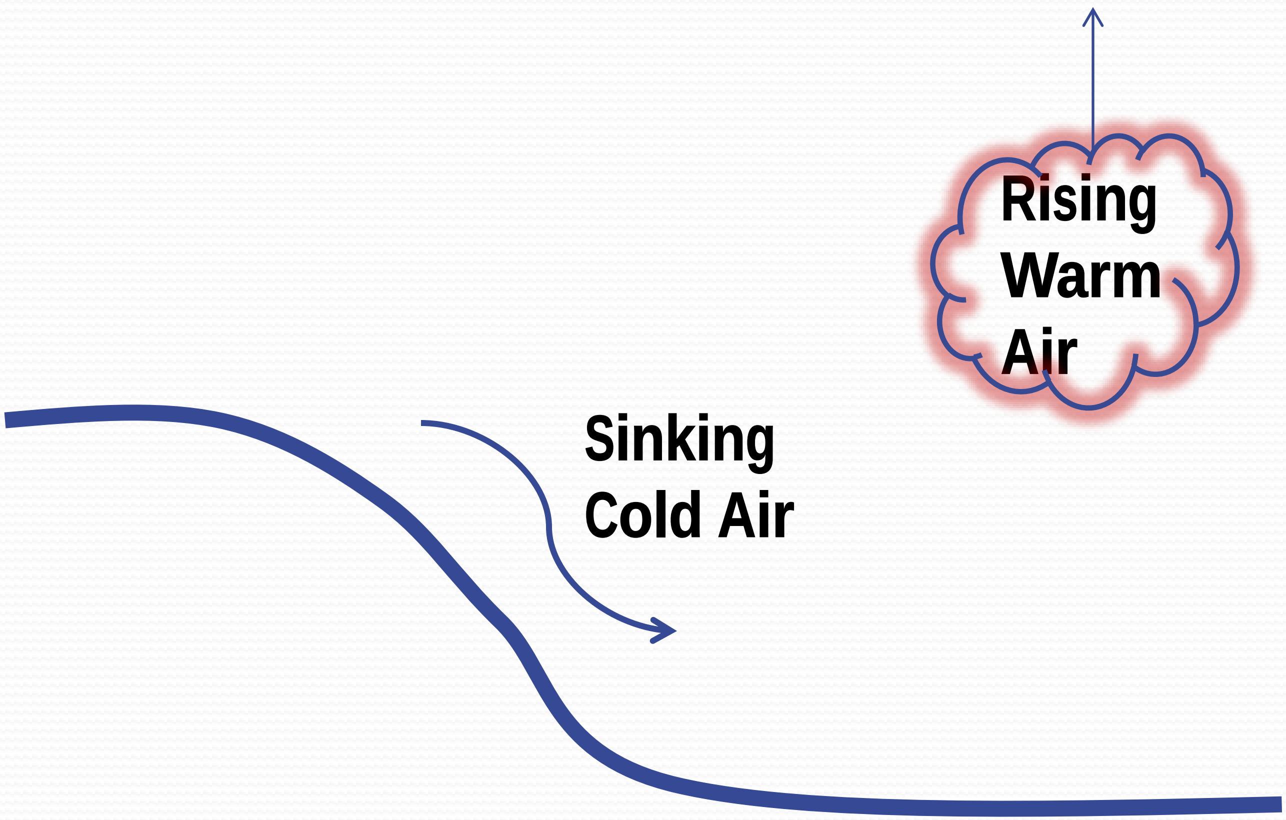
Night Time Occurrence



Down slope (Mountain) Wind

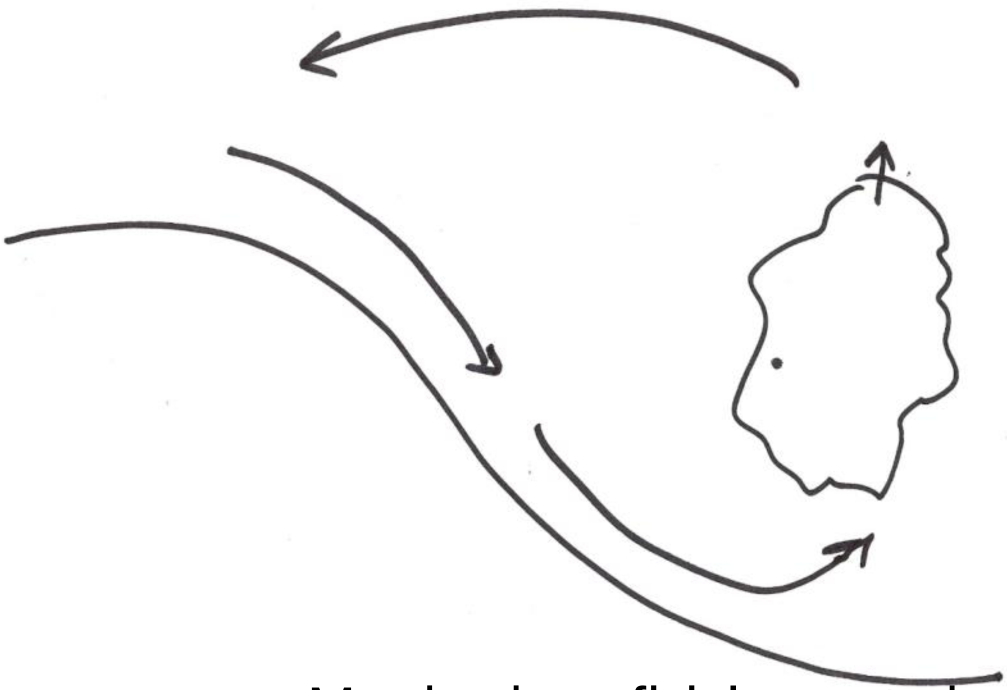


Down slope (Mountain) Wind



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

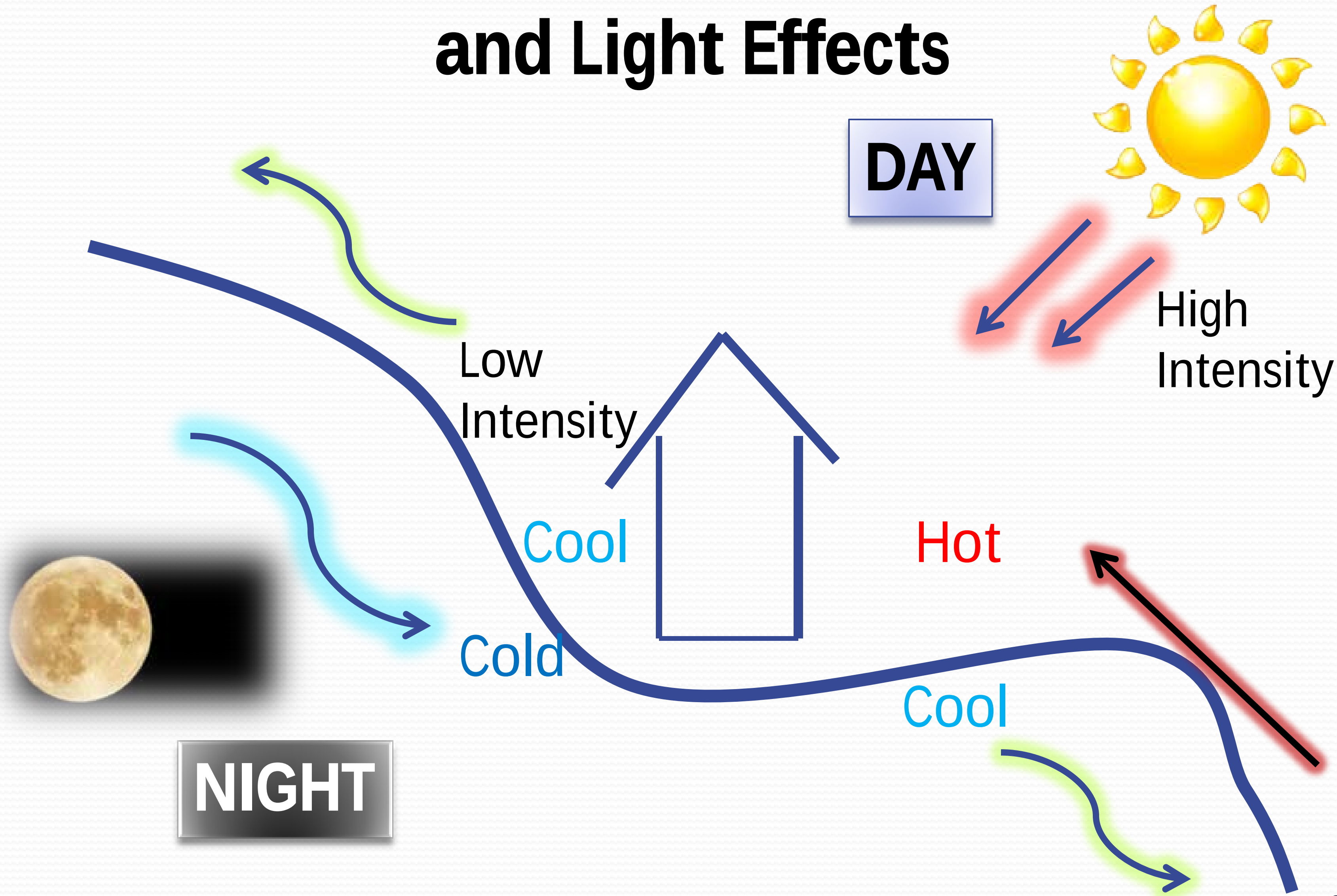
Temperature of Air

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



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

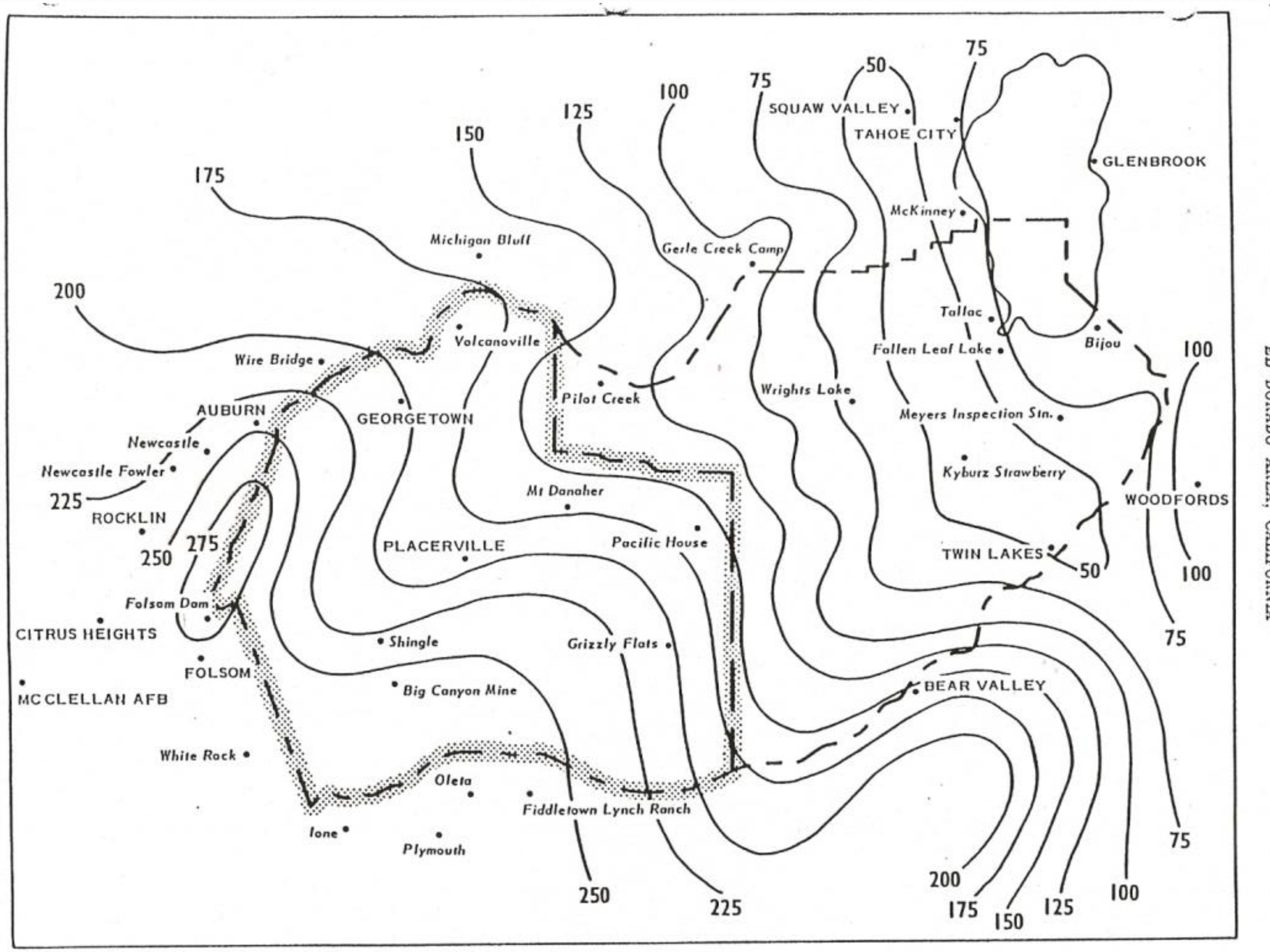


Figure 13.—Average length of growing season.

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

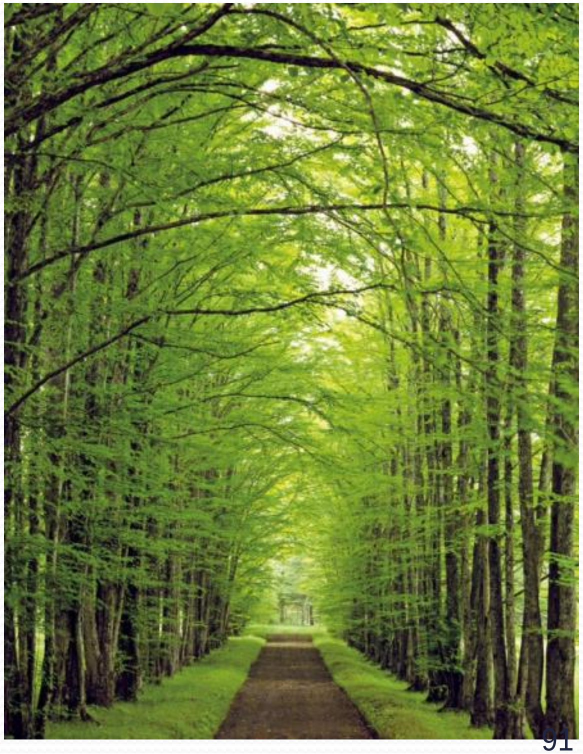
Micro-Climates Around the House

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

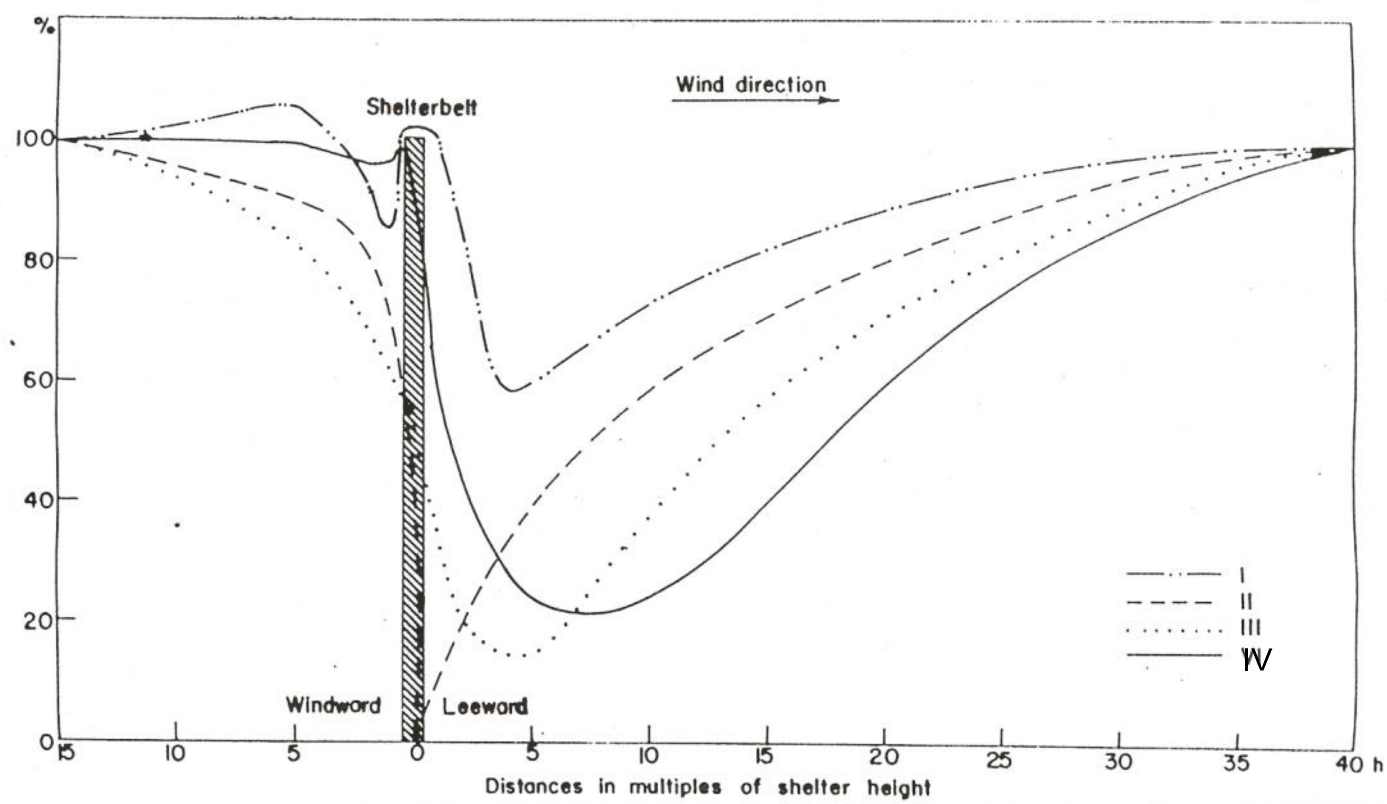
AGRICULTURE

- 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

Source: Agricultural Meteorology, J Y Wang



I - open throughout height of belt

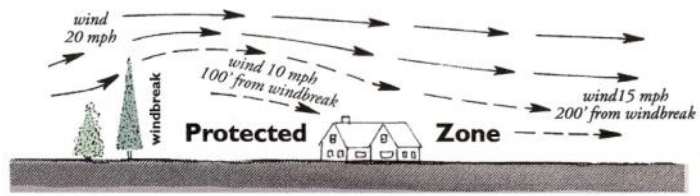
II – dense throughout height of belt

III – medium density below & dense above

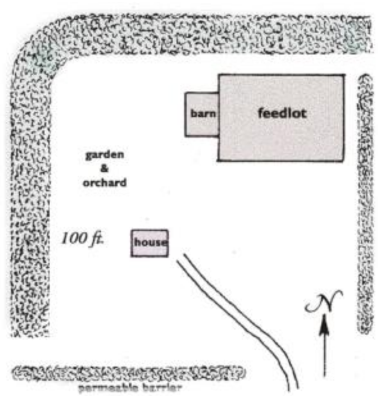
IV – medium density above & open below

Creating Your Own Micro-Climates: **Shelter Belts** - Farmstead Wind Break

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 30 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.

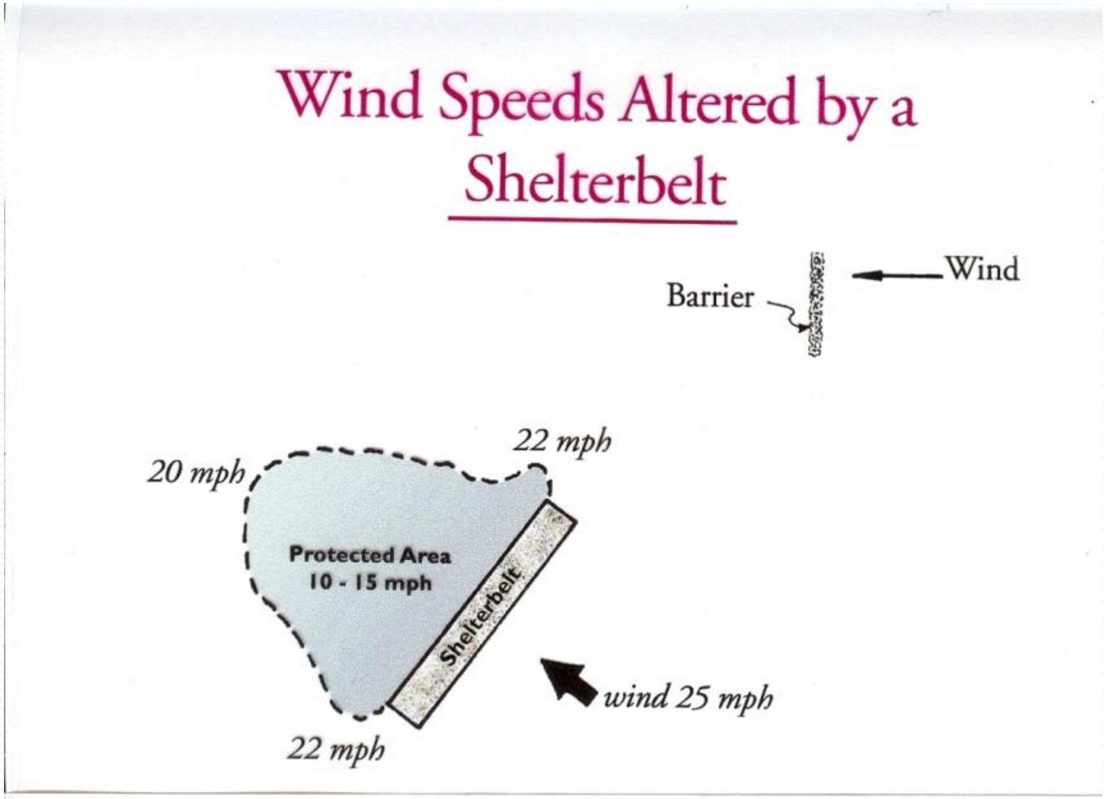
Creating Your Own Micro-Climates: Shelter Belts - Design and Arrangement

- 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

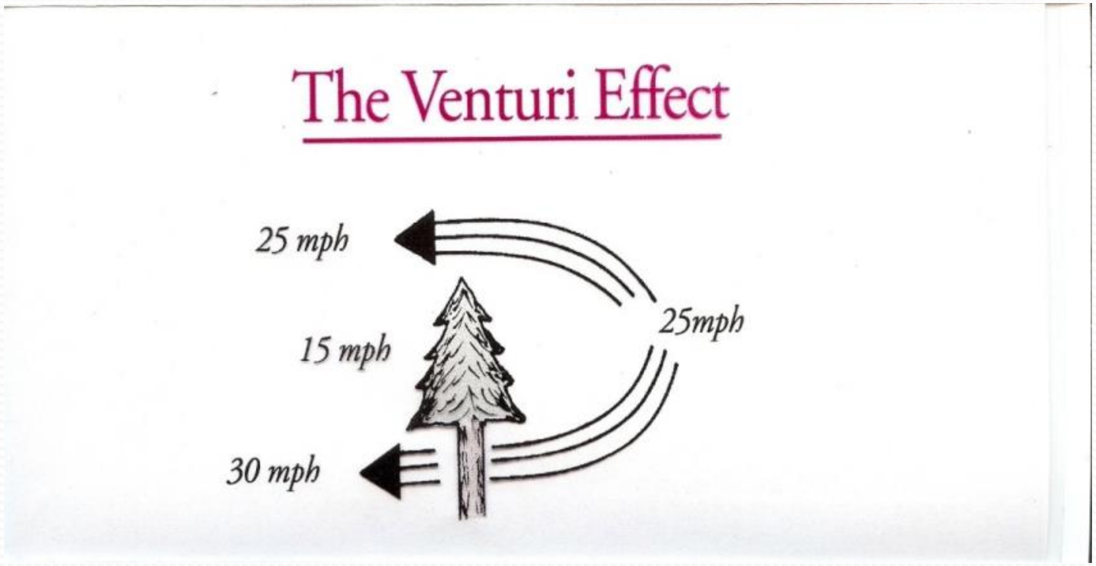
Cautions: Improperly-constructed shelter belts can increase windspeed

Extend the belt slightly beyond area to be protected



Creating Your Own Micro-Climates: Shelter Belts

Cautions: Avoid Breaks or Gaps in the Belt

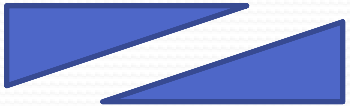


Driveway entrance:

NO:

Driveway entrance:

YES:



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

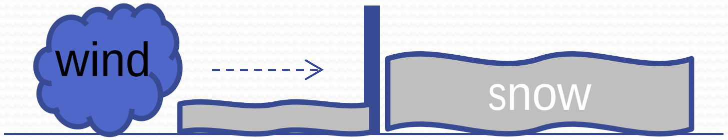
Deciduous trees and shrubs most effective in summer, but have a modifying effect in winter

Creating Your Own Micro-Climate: Shelter Belts

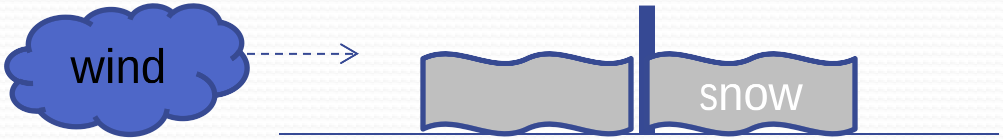
Controlling Snow

Shelter belts (snow fences) can control drift formation

<u>Open shelter belts</u> create drifts on the lee side



<u>Dense shelter belts</u> create drifts on both sides



Creating Your Own Micro-Climates: Shading

Shade trees significantly reduce home air conditioning costs

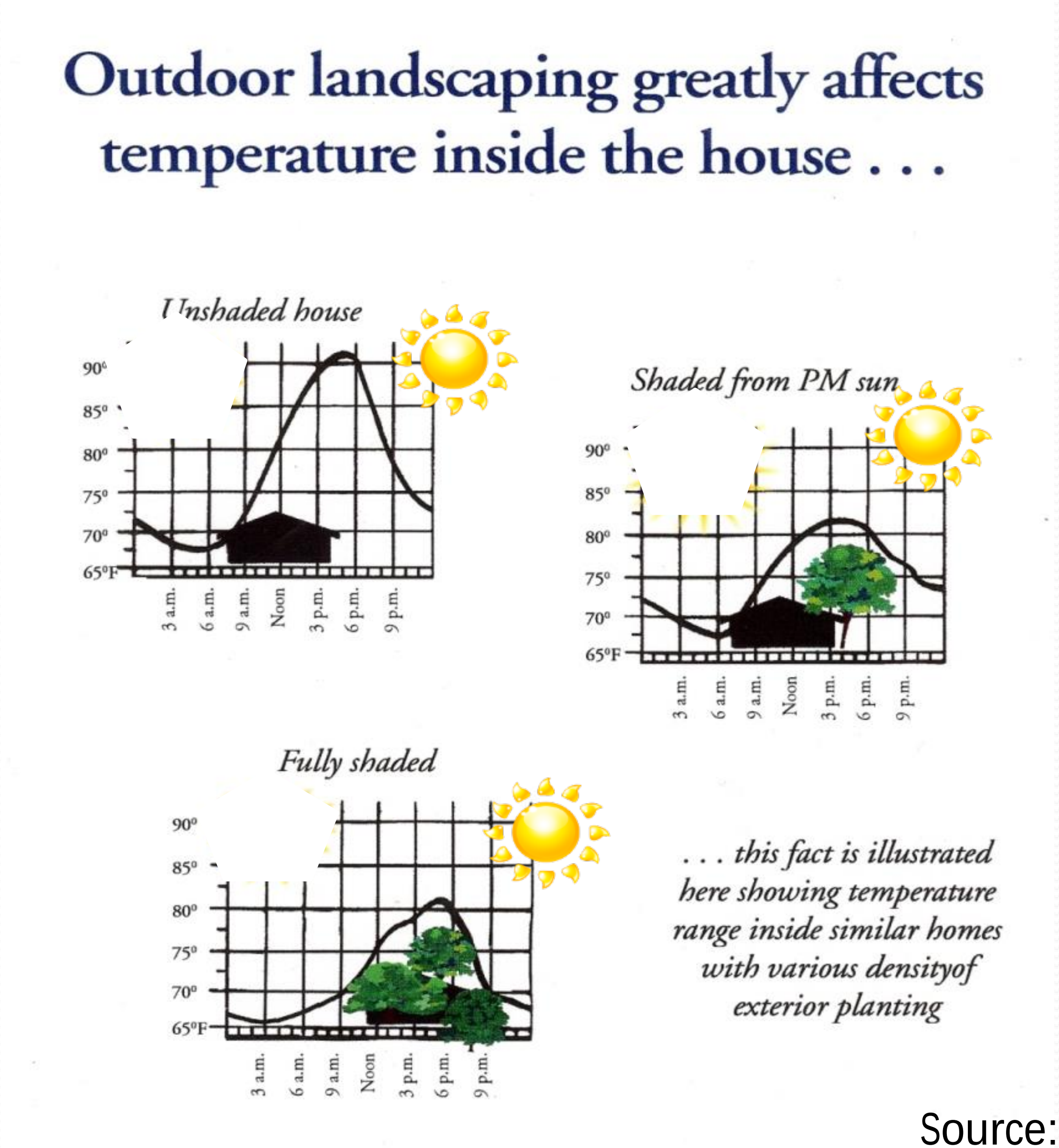
Large shade trees release 100 gallons of water on a hot day

- Humidifies air
- Cooling effect = 5 average size a/c's running 24 hr/day

Net cooling effect 10-15 degrees cooler under canopy

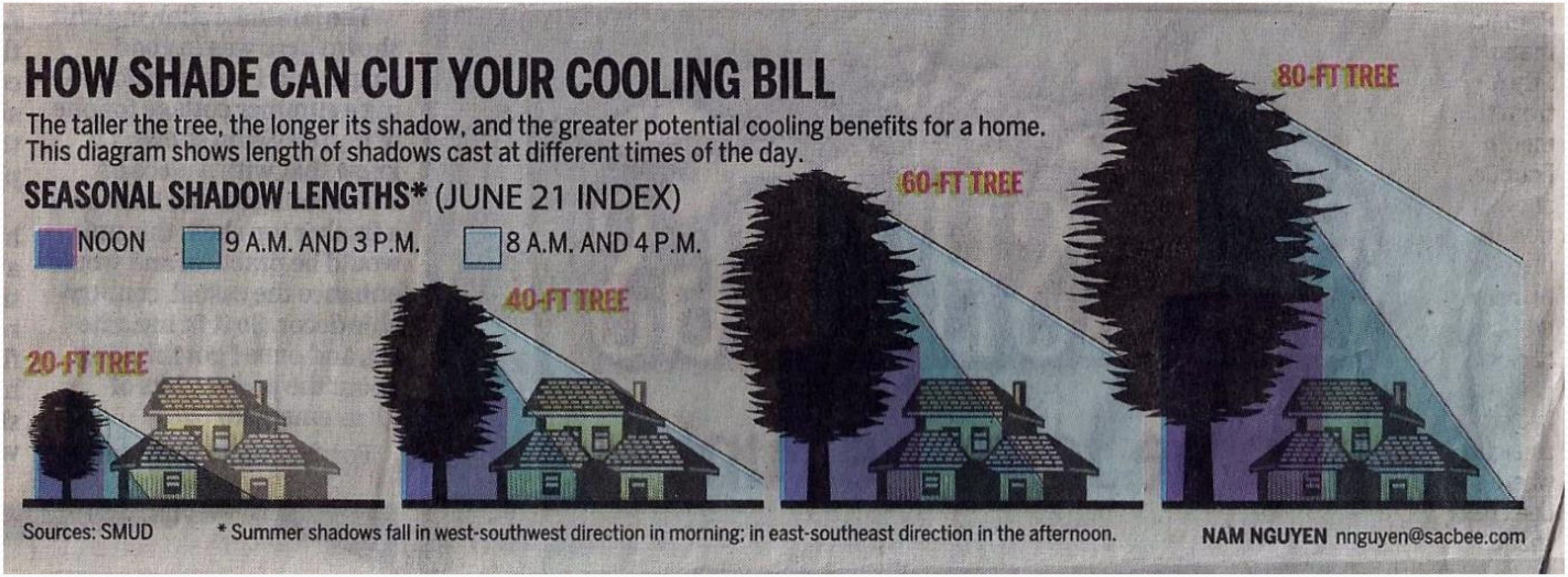
Also applies to garden areas, ***BUT:***

Creating Your Own Micro-Climate: Shading



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

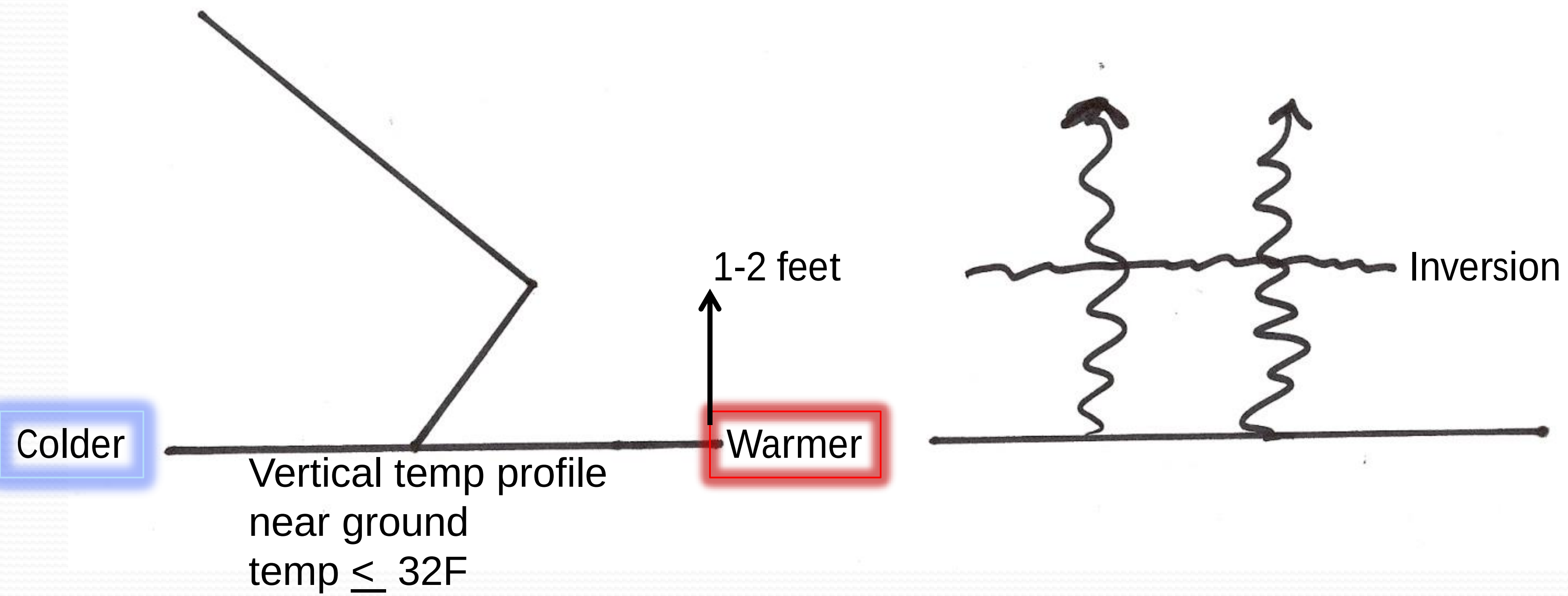
Extended cold spells – over several nights – are more damaging

Causes of Frost

Radiation

Advection

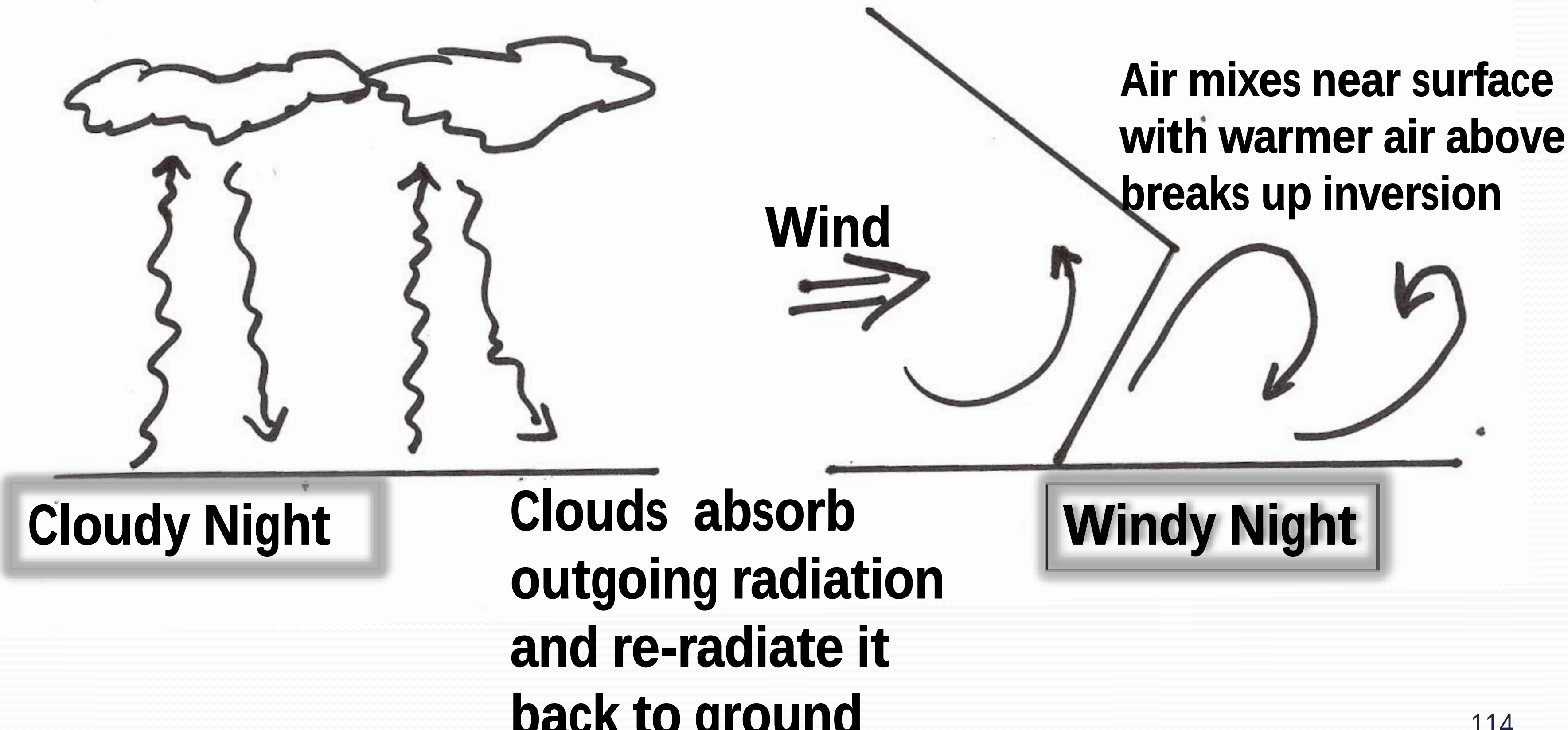
Causes of Frost



Strong radiation from ground drops temperature near ground to freezing or below

Causes of Frost

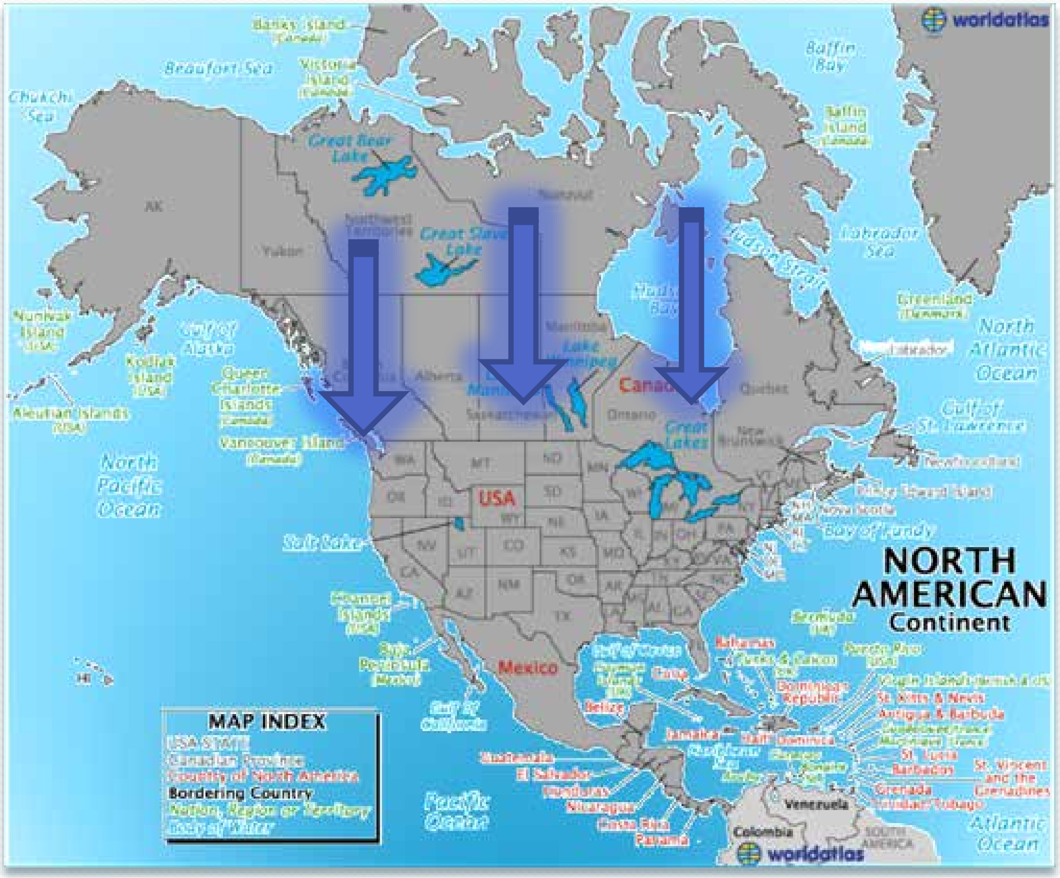
Radiation – Less Likely on Cloudy or Windy Nights



Causes of Frost

Advection – Cold Air Moves in From Somewhere Else

- Cold air drainage down slopes
- From another source region



Source: WWW.Worldatlas.com

Very hard to protect against, usually because of long duration

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

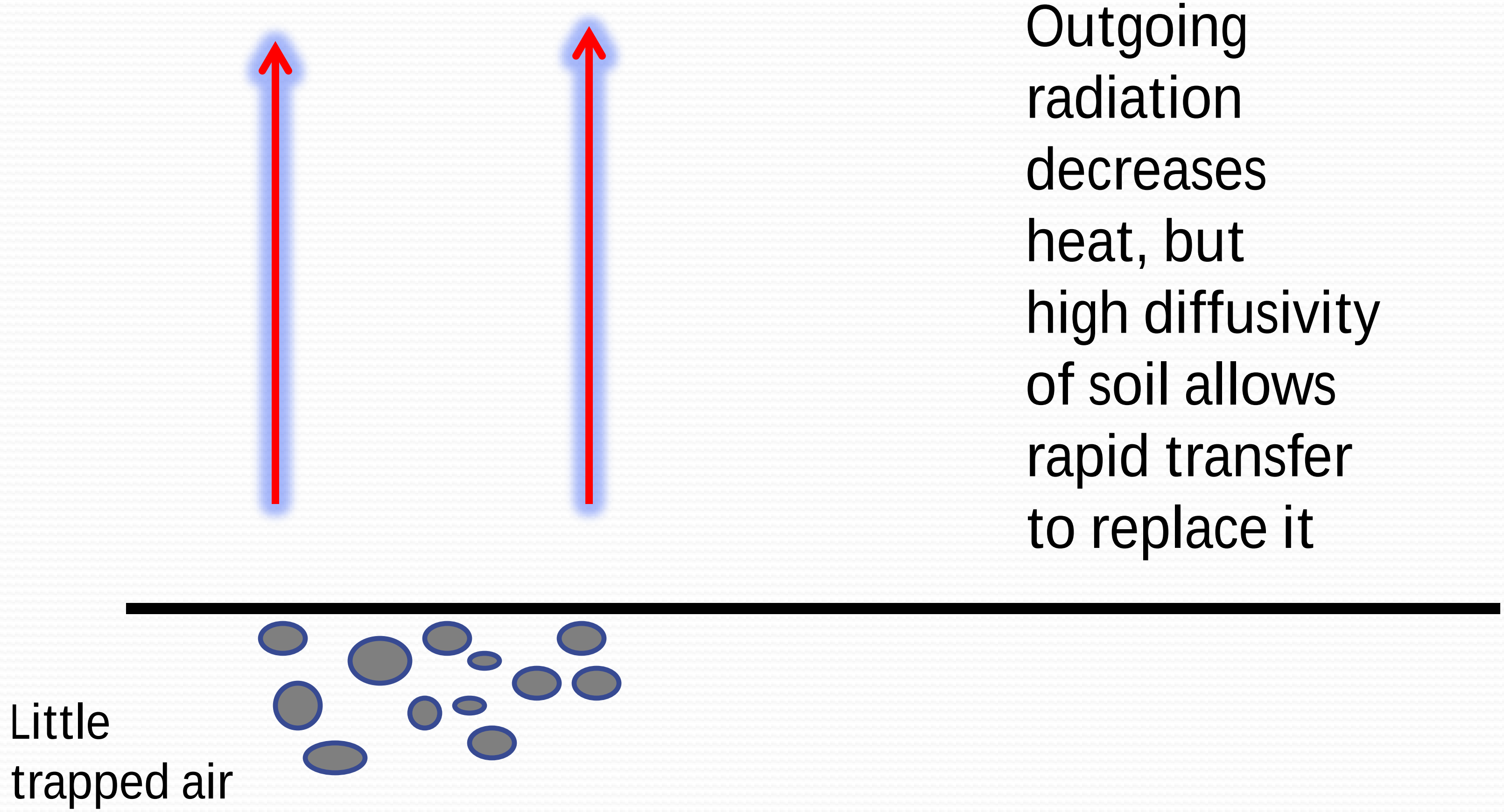
Soils

High diffusivity soils – Clay and loam
Packed or compacted soils

Low Diffusivity Soils – Peat
Sandy
Recently worked

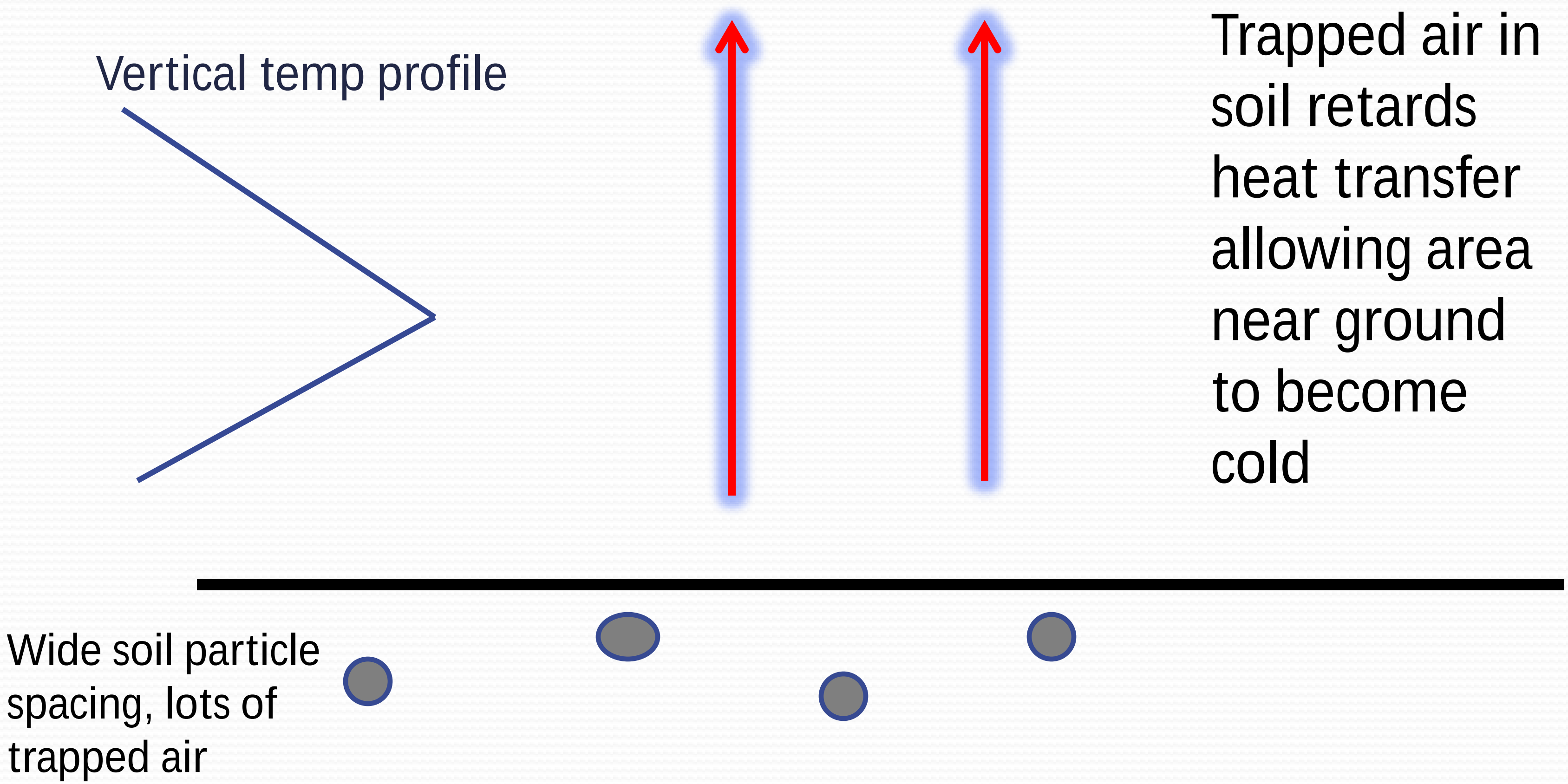
WHY ? – IT'S THE AIR

Effects of Soils, Mulch, and Snow



Clay and loam soil

Effects of Soils, Mulch, and Snow

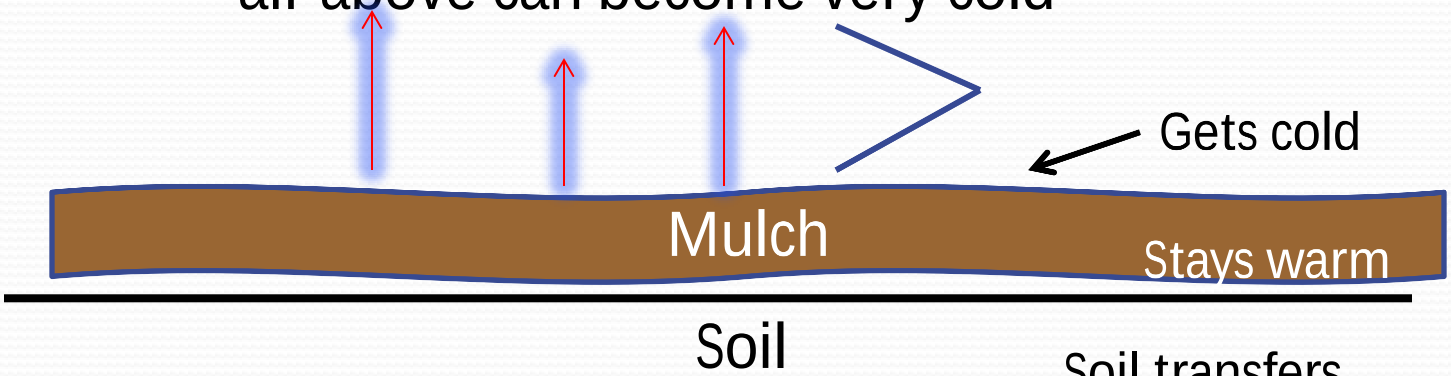


Peat and recently worked soil

Effects of Soils, Mulch and Snow

Mulches: A two-edged sword

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



Soil transfers heat to mulch, but trapped air in mulch retards heat transfer to surface

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

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

<u>Commercially</u> – blowers, wind machines, and helicopters

<u>For the rest of us -</u>

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

Covers, frost cloth, blankets, etc

Wet Soil

Drain irrigation lines

Frost caps

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!

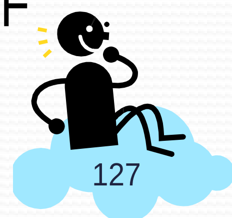
Depends on -

- 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:

Elevation	Approximate Dates
1000 Feet	April 15
2000 Feet	April 22
3000 Feet	April 30
4000 Feet	May 07

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

THE ROBINSON ANEMOMETER.

Proper Siting

<u>Barometer</u>

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

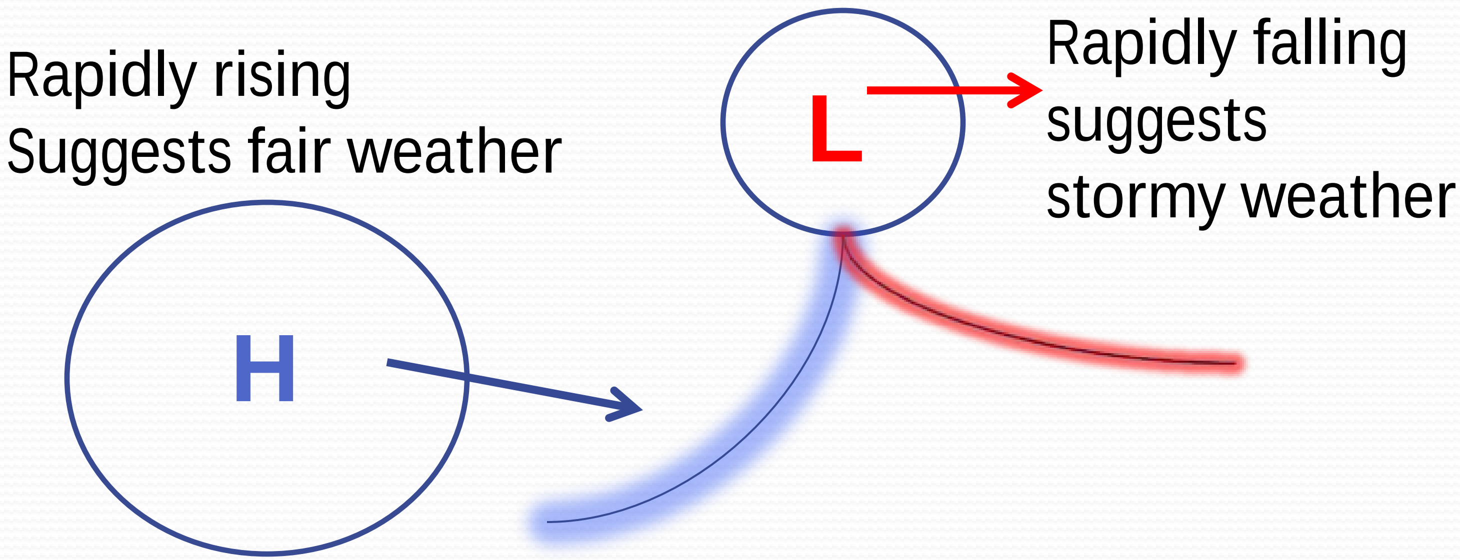
Using the barometer

Using the wind

Watching the clouds

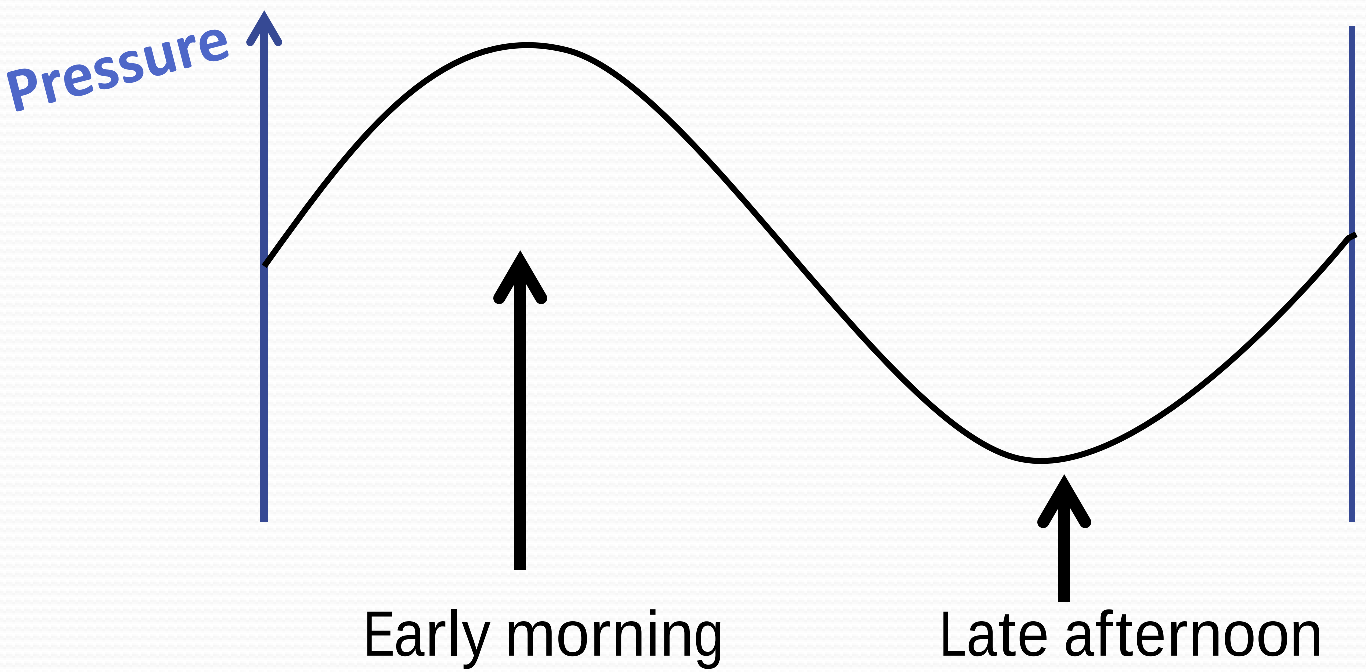
Using The Barometer

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



Using the Barometer

Watch Out for Diurnal Variation



Using the Barometer

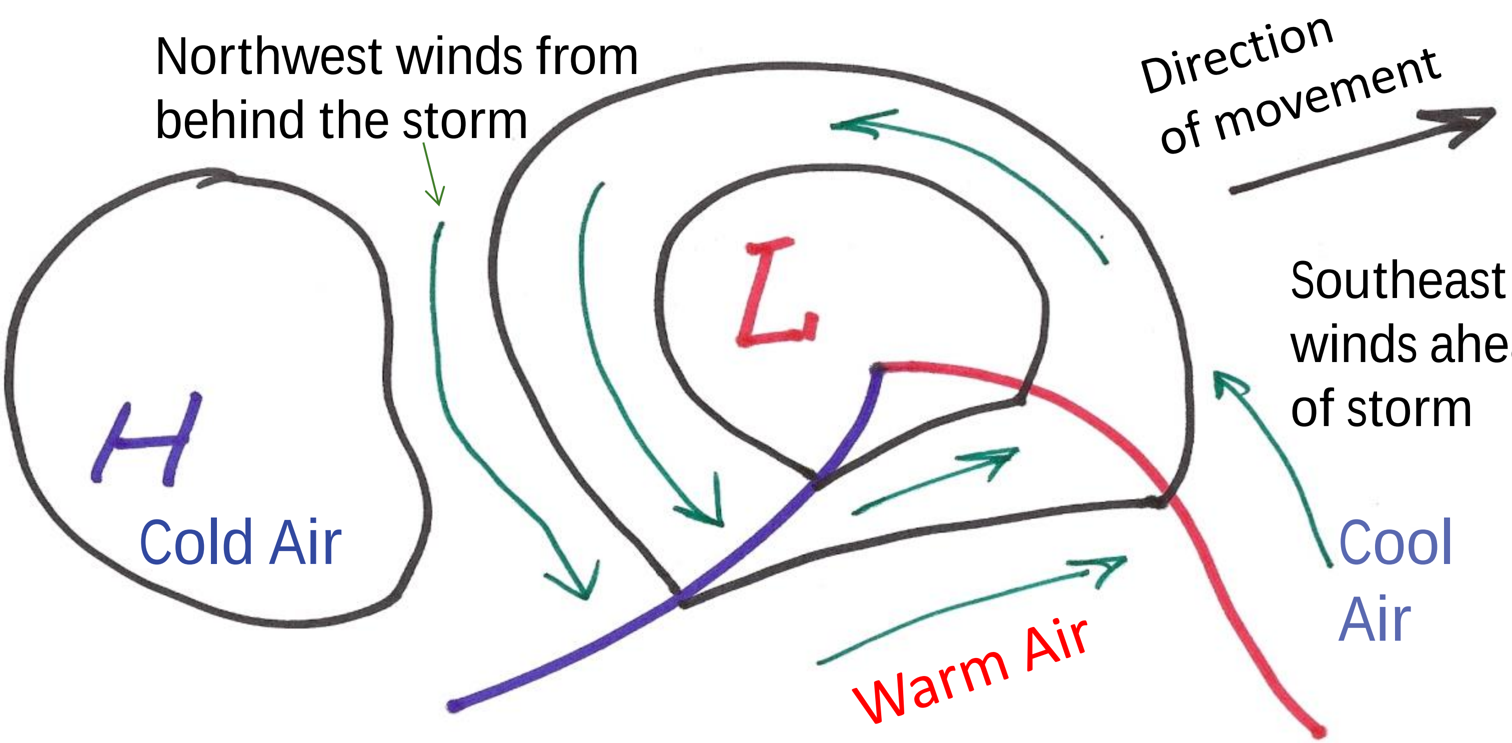
Rapid rise after cold front passage

- 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

Using The Winds

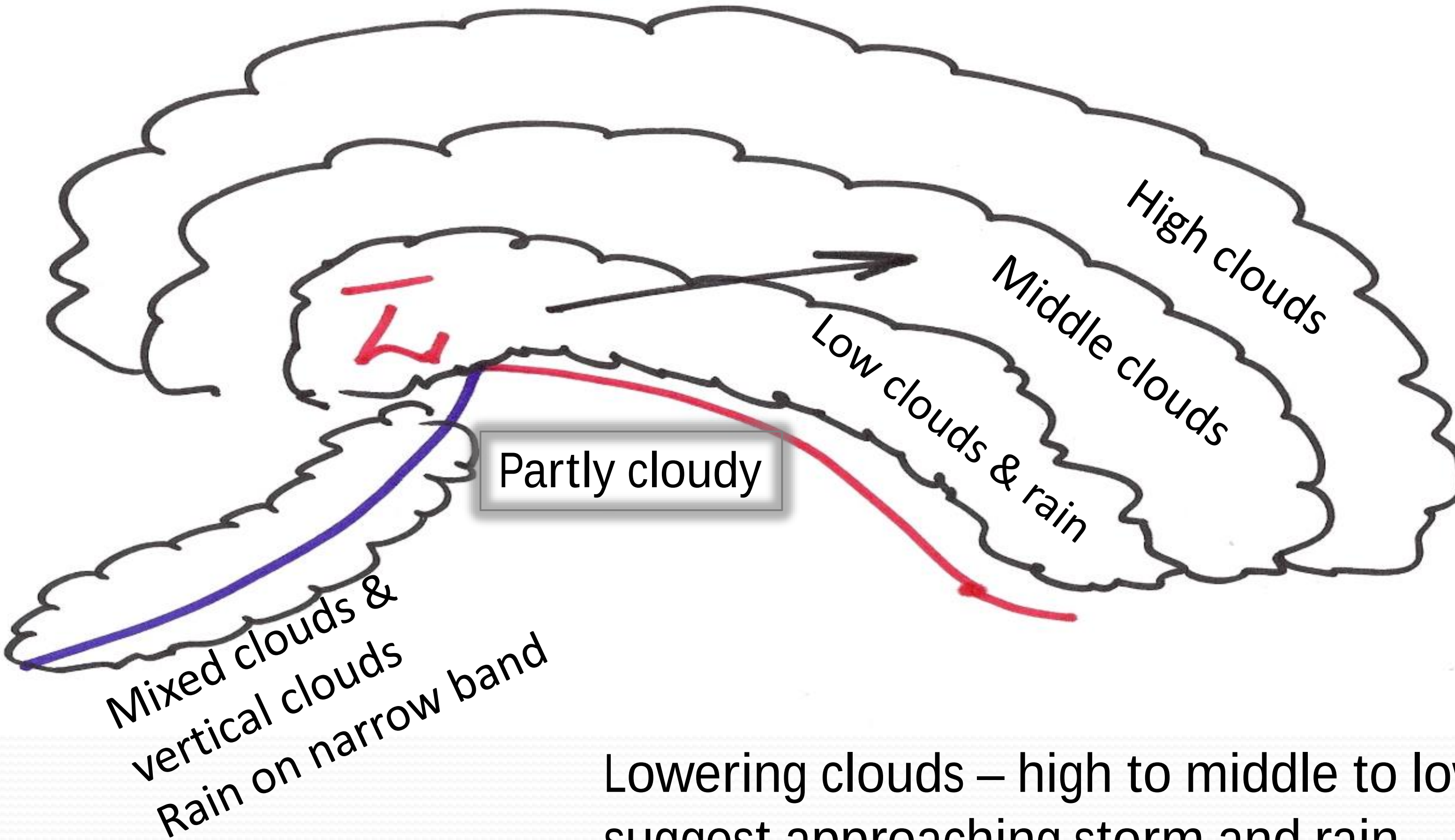


Sustained southeast winds suggest storm and rain

Switch in winds from southeast or southwest to north or northwest indicate end of rain, clearing, cooling

Winds at night, no radiational frost

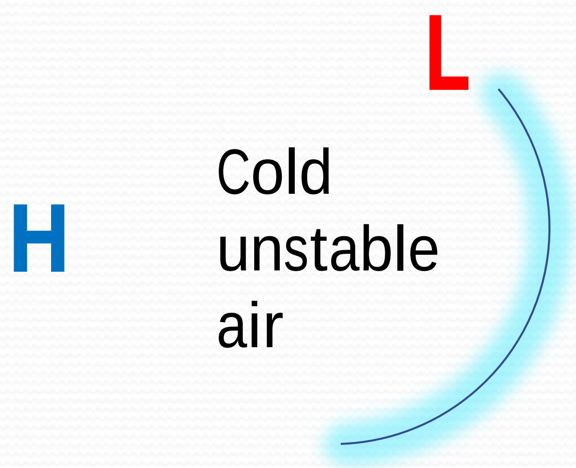
Watching The Clouds



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

Clearing in late afternoon or early evening suggest possible morning frost

Watching The Clouds



Clearing skies in morning after cold front passage often results in

- Strato-Cumulus in mid-morning
- Perhaps showers in late afternoon
- Clearing in evening
- Possible morning frost

Clouds at night – no radiation frost

Thank You !

Any Questions ?

UCCE Master Gardeners of El Dorado County

Master Gardener
UNIVERSITY OF CALIFORNIA
COOPERATIVE EXTENSION

HEALTHY ENVIRONMENTS

University of California
Agriculture and Natural Resources

Making a Difference
for California