



FROST PROTECTION FOR URBAN GARDENS

BRANDON MERCHANT

- Arizona Native
- Owner of Southwest Victory Gardens
- Former Pima County Certified Master Gardener
- Former President of Tucson Organic Gardeners
- SmartScape Certified





WWW.SOUTHWESTVICTORYGARDENS.COM/DOCUMENTS

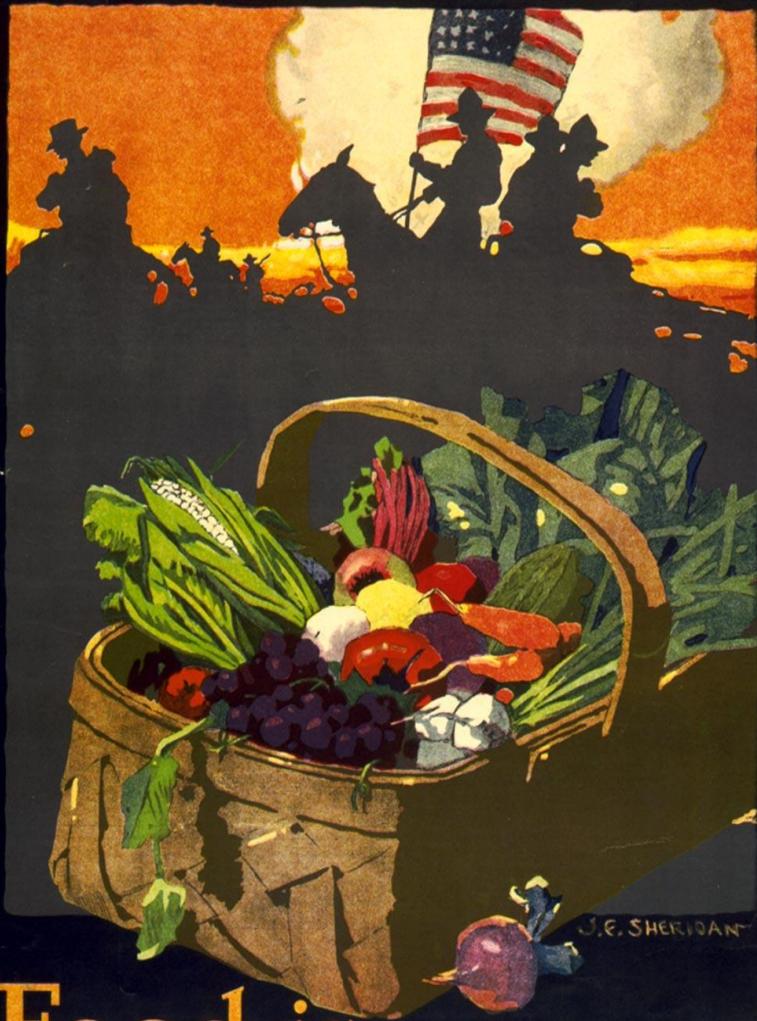
OUR PHILOSOPHY

- Healthy soil encourages healthy plants
- Healthy plants care for themselves
- Limit external inputs
- Reduce water usage
- Garden with our climate not against it
- Encourage a natural ecosystem
- Build community through gardening



WHAT IS SUSTAINABLE GARDENING?

- Reducing or Eliminating the Use of Inputs
- Focus on improving soil
- Enhancement of entire ecosystem
- Reduction of water use
- Working Smarter



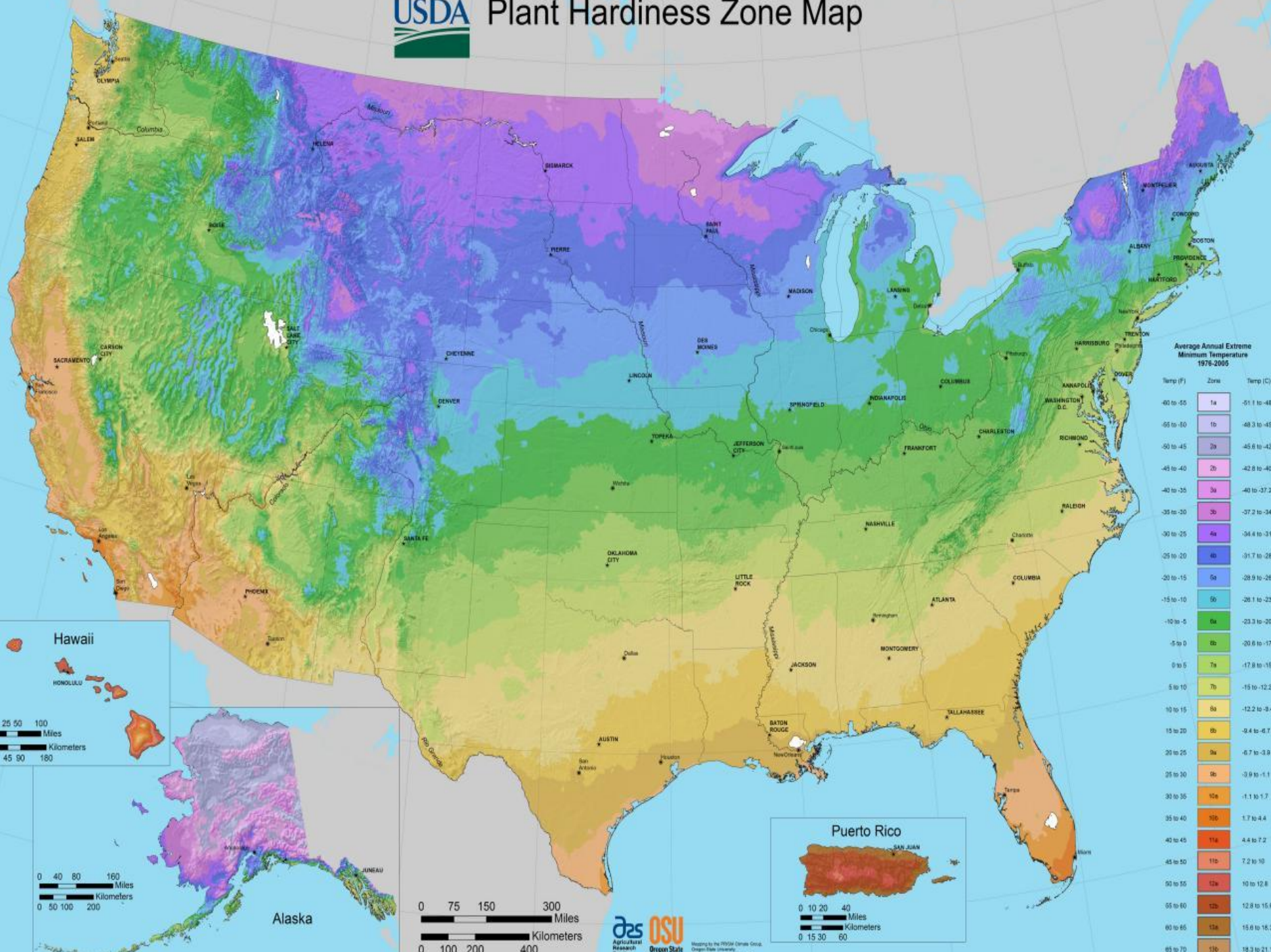
Food is
Ammunition-
Don't waste it.

PLANT HARDINESS

- Tender – Killed by Cold
- Hardy – Cold Tolerant

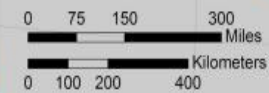
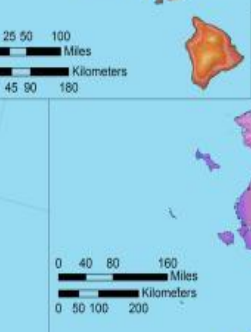
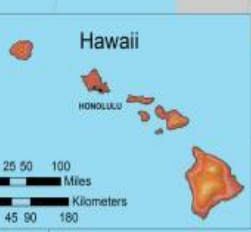


USDA Plant Hardiness Zone Map



Average Annual Extreme Minimum Temperature 1976-2005

Temp (F)	Zone	Temp (C)
-60 to -55	1a	-51.1 to -48.3
-65 to -60	1b	-48.3 to -45.6
-50 to -45	2a	-45.6 to -42.8
-45 to -40	2b	-42.8 to -40.0
-40 to -35	3a	-40.0 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 -15.0
5 to 10	7b	-15.0 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 10.0
50 to 55	12a	10.0 to 12.8
55 to 60	12b	12.8 to 15.6
60 to 65	13a	15.6 to 18.3
65 to 70	13b	18.3 to 21.1

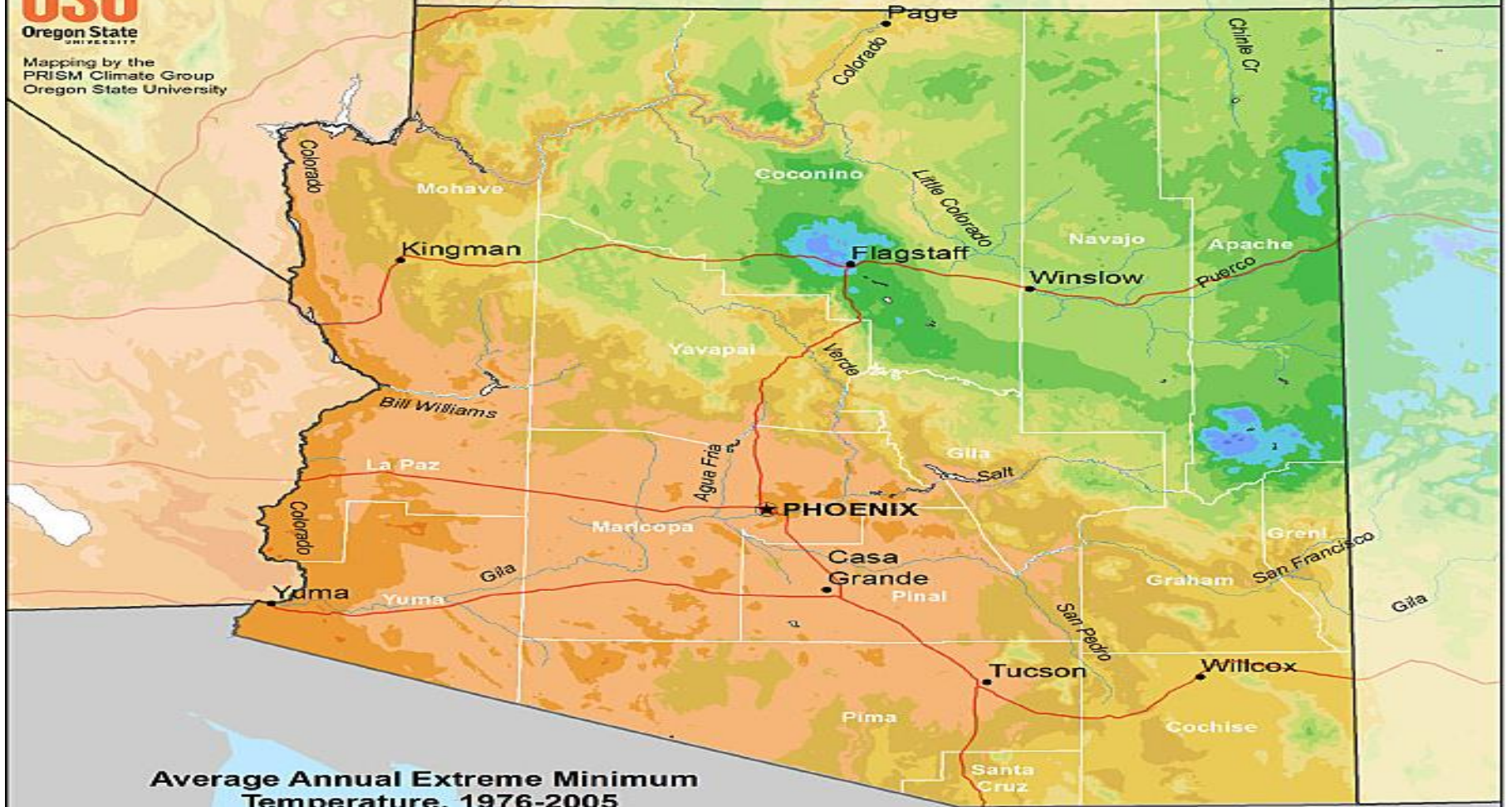


Oregon State University

 Mapping by the USDA Climate Center, Oregon State University

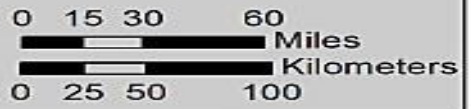
 Map Update: oregonclimate.edu, 2012

Arizona

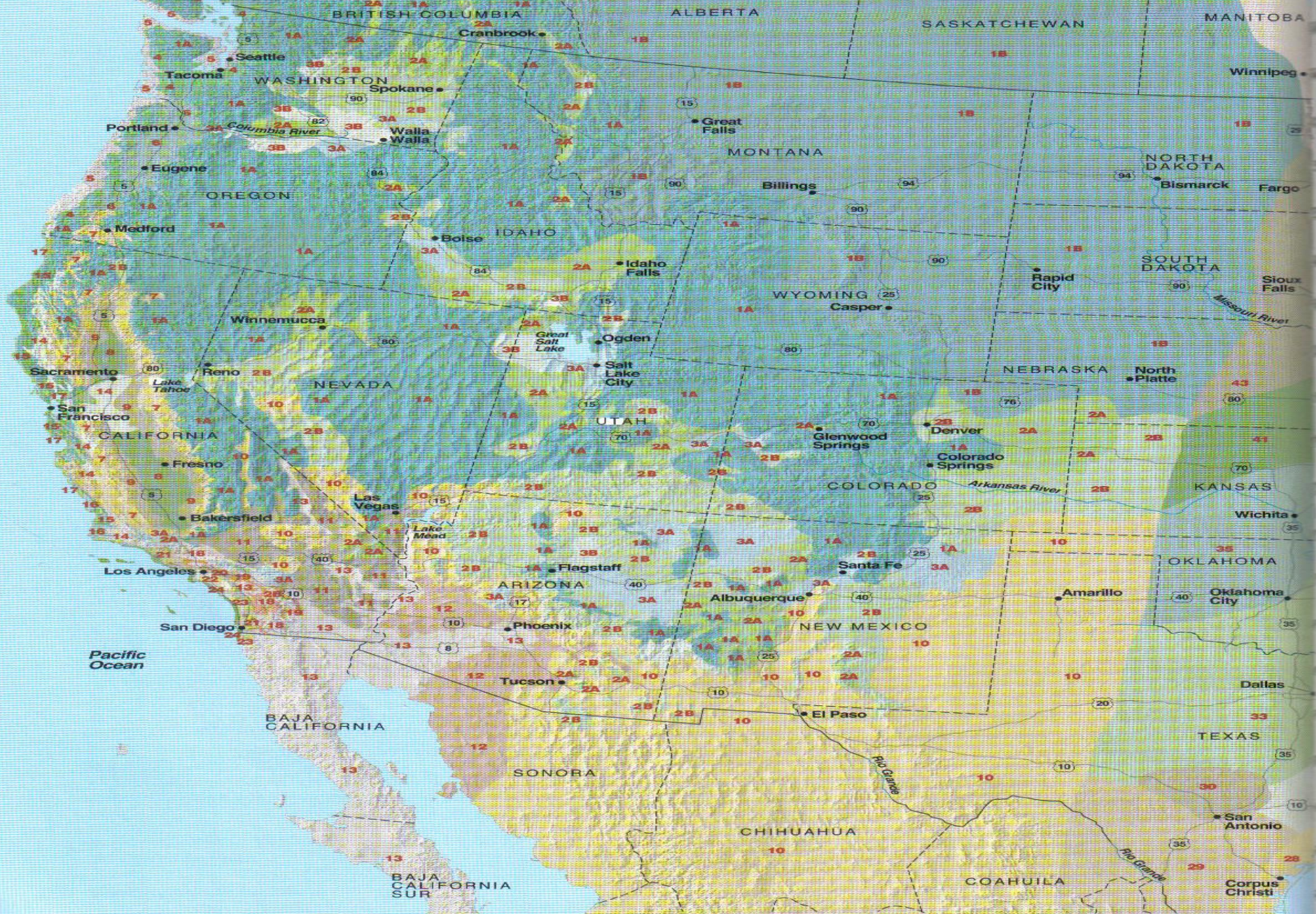


Average Annual Extreme Minimum Temperature, 1976-2005

Temp (F)	Zone	Temp (C)	Temp (F)	Zone	Temp (C)	Temp (F)	Zone	Temp (C)
-25 to -20	4b	-31.7 to -28.9	0 to 5	7a	-17.8 to -15	25 to 30	9b	-3.9 to -1.1
-20 to -15	5a	-28.9 to -26.1	5 to 10	7b	-15 to -12.2	30 to 35	10a	-1.1 to 1.7
-15 to -10	5b	-26.1 to -23.3	10 to 15	8a	-12.2 to -9.4	35 to 40	10b	1.7 to 4.4
-10 to -5	6a	-23.3 to -20.6	15 to 20	8b	-9.4 to -6.7			
-5 to 0	6b	-20.6 to -17.8	20 to 25	9a	-6.7 to -3.9			



Sunset's Garden Climate Zones



Climate Zones

1A	1B	2A	2B	3A	3B	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
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Tucson
Organic
Gardeners

soiling our hands since 1971

TUCSON ORGANIC GARDENERS PLANTING GUIDE

FOR TUCSON AND THE LOW DESERT

Jan 1 – Feb 15

FROM SEED

Arugula, Broccoli, Cabbage, Chinese Cabbage, Cauliflower, Celery, Cilantro, Collards, Dill, Fennel, Kale, Lettuce, Mustard Parsley, Bulb Onion (See Graphic), Potato

FROM SEEDLING TRANSPLANT

Artichoke, Broccoli, Cabbage, Chinese Cabbage, Cauliflower, Celery, Cilantro, Collards, Dill, Fennel, Kale, Lettuce, Mustard, Parsley, Spinach, Swiss Chard.

April 15 – May 31

FROM SEED

Amaranth, Basil, Cantaloupe, Cowpea, Cucumber, Malabar Spinach, Melon, Okra, Sorghum, Sweet Potato Slips, Summer Squash, Watermelon

FROM SEEDLING TRANSPLANT

Basil, Eggplant, Pepper

July 15 – August 31

FROM SEED

Bush Beans, Pole Beans, Corn (all types), Cowpea, Cucumber, Cantaloupe, T'itois Onion (See Graphic), Pumpkin, Sorghum Summer and Winter Squash

FROM SEEDLING TRANSPLANT

Tomato (July 15 - Aug 15)

Oct 15 - Nov 15

FROM SEED

Beets, Carrots, Garlic, Greens, Lettuce, Mustard, Pea, Radish, Turnip, Wheat (December – January)

FROM SEEDLING TRANSPLANT

Broccoli, Cabbage, Chinese Cabbage, Cauliflower, Celery, Cilantro, Collards, Dill, Fennel, Kale, Lettuce, Mustard Parsley, Spinach, Swiss Chard

LATE WINTER

SPRING

LATE SPRING

EARLY SUMMER

MONSOON

EARLY FALL

LATE FALL

March 1 – April 15

FROM SEED

Amaranth, Basil, Bush Bean, Corn (Sweet), Cucumber, Jerusalem Artichoke, Malabar Spinach, Melon, Pumpkin, Sesame, Sorghum, Summer and Winter Squash, Tobacco, Watermelon

FROM SEEDLING TRANSPLANT

Basil, Eggplant, Pepper, Tomato, Tomatillo

June 1 – June 15

FROM SEED

Pole Beans, Cantaloupe, Cowpea, Melon, Sweet Potato Slips

Sep 1 – Oct 15

FROM SEED

Arugula, Beet, Bok Choy, Broccoli, Brussels Sprouts, Cabbage, Carrot, Cauliflower, Celery, Chia, Chicory, Chinese Cabbage, Cilantro, Collards, Escarole, Fava, Garbanzo, Greens, Kale, Kohlrabi, Leek, Lentils, Lettuce, Maché, Mustard, Onion (See Graphic), Parsley, Parsnip, Pea, Radish, Rape, Rutabaga, Turnip, Spinach, Swiss Chard

FROM SEEDLING TRANSPLANT

Broccoli, Brussels Sprouts, Cabbage, Chinese Cabbage, Cauliflower, Celery, Cilantro, Dill, Fennel, Kale, Lettuce, Mustard, Parsley, Spinach, Swiss Chard

ONIONS



"SHORT-DAY" BULB ONION SETS

January 1 – February 15

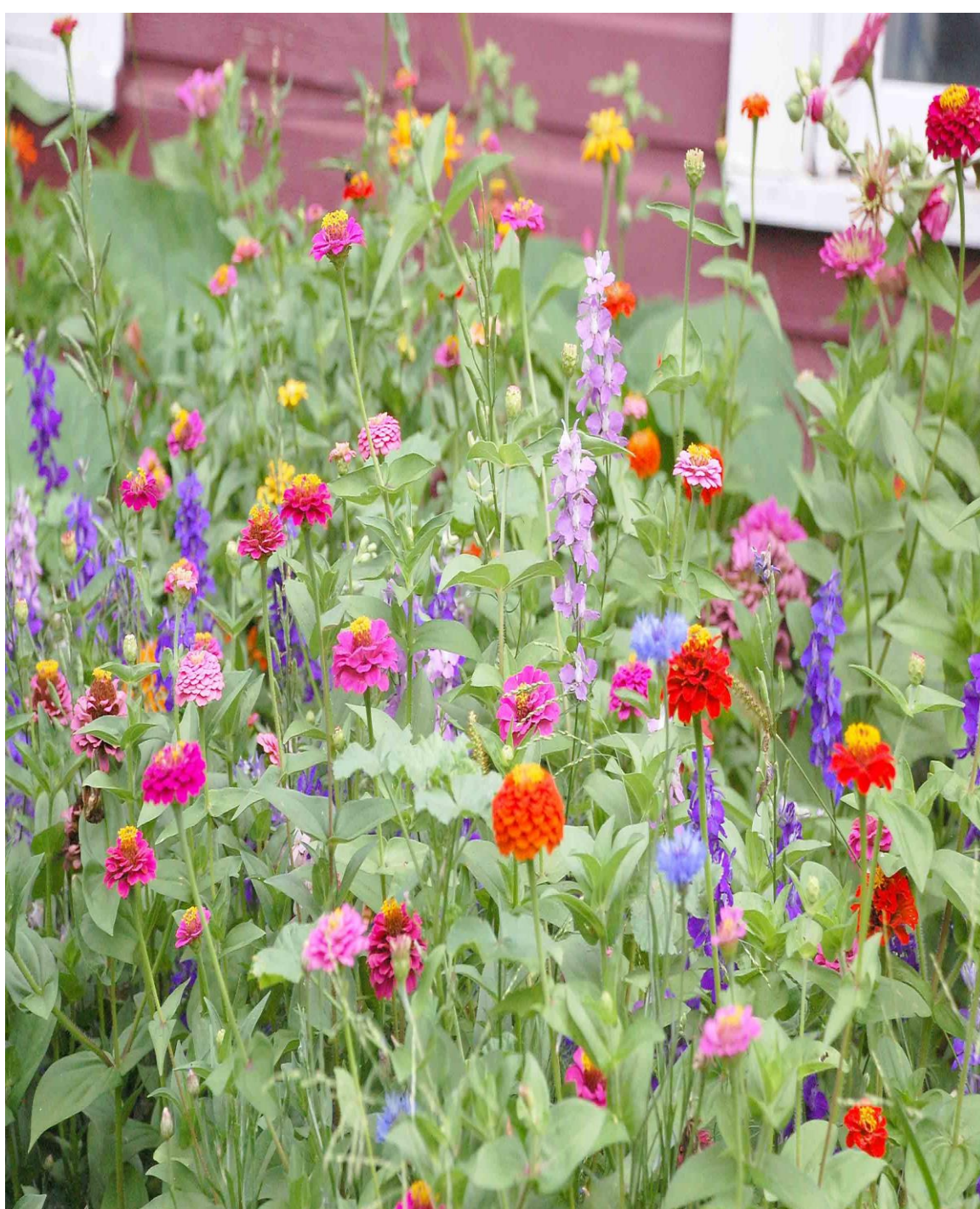
TOHONO O'ODHAM I'TOIS MULTIPLIER ONION

July 15 – February 1

GREEN BUNCHING/SCALLION

August 15 – February 1



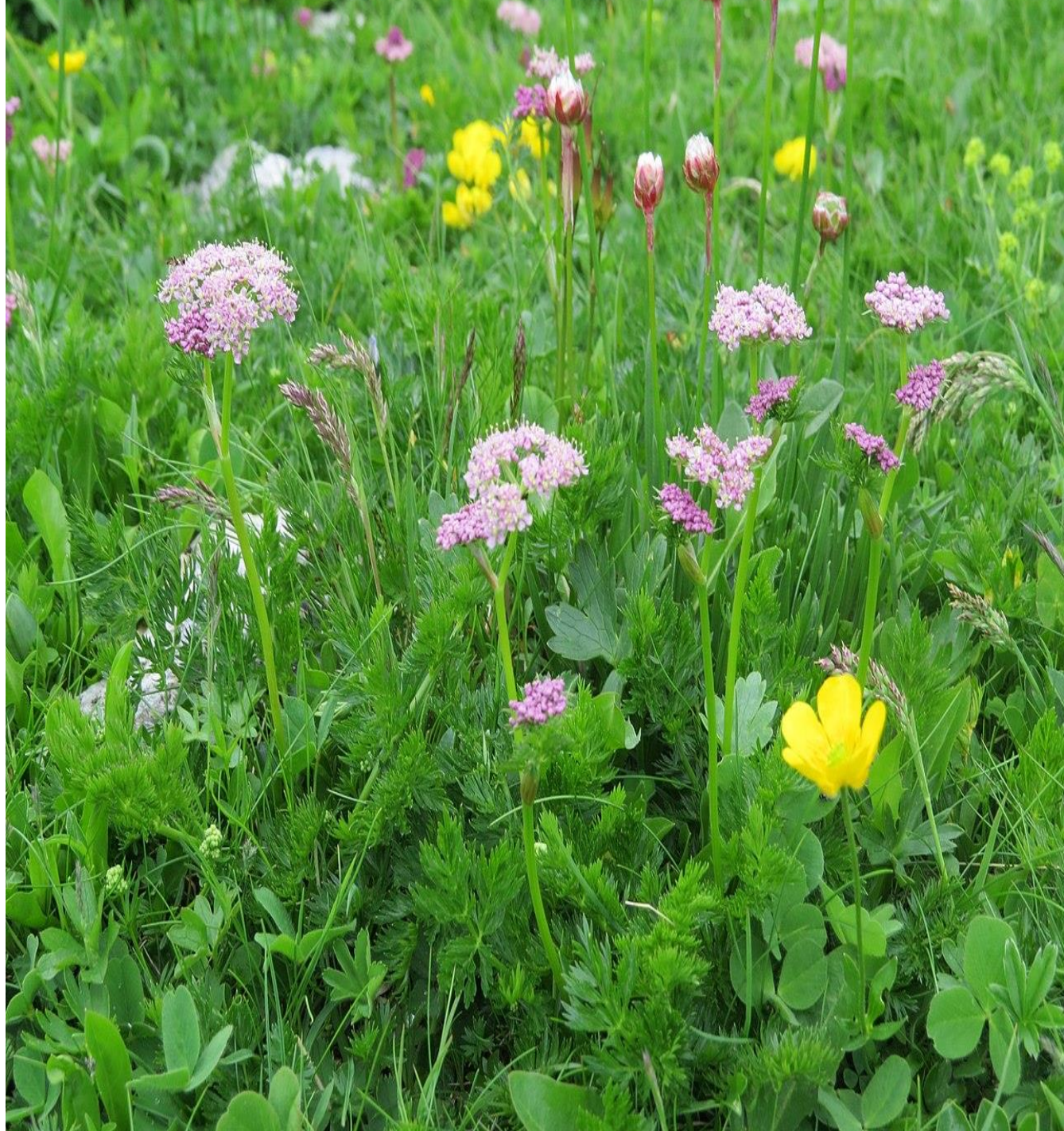


TENDER ANNUALS

- Squash and Melons
- Nightshades
- Basil
- Beans*
- Summer Flowers and Grains

COLD HARDY ANNUALS

- Brassicas
- Root Crops
- Leafy Greens
- Winter Herbs
- Peas/Beans*



When do I sow?

The front of the packet gives a quick answer, while the instructions on the back are more specific.

Which varieties are natives and heirlooms?

Natives and heirloom varieties are color-coded right on the front of the packet.

How do I plant this variety?

The plant tag on the back includes the important sowing information, including seed depth, seed/row spacing, and when/how to thin. It also shows a seedling illustration for reference while your plant is growing.



Which varieties are organic?

Look for the green bar and organic logo across the top of the packet.

What's inside the packet?

When to harvest, recipes, history, easy growing tips, organic pest control, and much more specific information can be found inside.

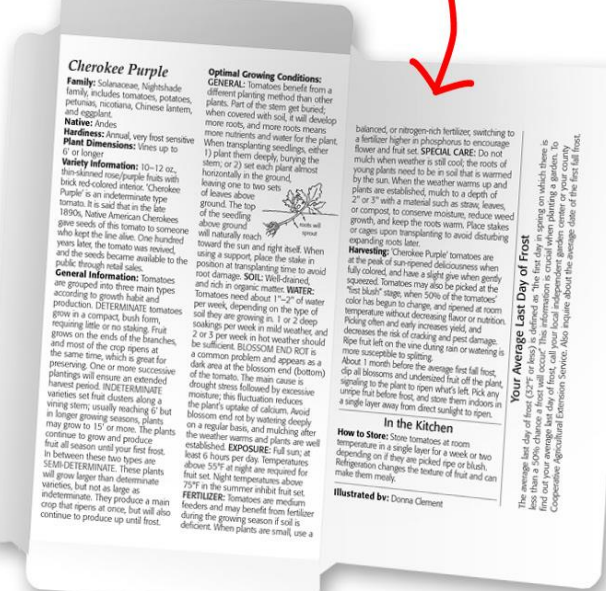
How much will this packet sow?

All vegetable and herb packets include coverage information.



Are these seeds Non-GMO?

Yes! We completed the rigorous seed testing to place the Non-GMO Project Verified logo on the back of every seed packet.



Cherokee Purple
Family: Solanaceae, Nightshade family, includes tomatoes, potatoes, peppers, cucumbers, Chinese lantern, and eggplant.
Native: Indies
Hardiness: Annual, very frost sensitive 61 or longer
Plant Dimensions: Vines up to 10' or longer
Variety Information: 10-12 oz., thin-skinned rose/purple fruits with black red-colored interior. Cherokee Purple is an indeterminate type tomato. It is said that in the late 1890s, Native American Cherokee gave seeds of this tomato to someone who kept the line alive. One hundred years later, the tomato was re-introduced to the public through retail sales.
General Information: Tomatoes are grouped into three main types according to growth habit and production. DETERMINATE tomatoes grow in a compact, bush form, requiring little or no staking. Fruit grows on the ends of the branches, and most of the crop ripens at the same time, which is great for preserving. One or more successive plantings will ensure an extended harvest period. INDETERMINATE vining stems, usually reaching 6' but in larger growing seasons, plants continue to grow and produce fruit all season until your first frost. In between these two types are will grow larger than determinate varieties, but not as large as indeterminate. They produce a main crop that ripens at once, but will also continue to produce up until frost.
Optimal Growing Conditions:
GENERAL: Tomatoes benefit from a different planting method than other plants. Part of the stem gets buried, when covered with soil, it will develop more roots, and more roots means more nutrients and water for the plant.
 1) plant them deeply, burying the stem horizontally in the ground, leaving one to two sets of leaves above ground. The top of the seedling above ground will naturally reach 9" over toward the sun and right itself when using a support, place the stake in position at transplanting time to avoid root damage. **SOIL:** Well-drained and rich in organic matter. **WATER:** Tomatoes need about 1 1/2" of water per week in mild weather, and 2 or 3 per week in hot weather should be sufficient. **BLOSSOM END ROT** is a common problem and appears as a dark area at the blossom end (bottom) of the tomato. The main cause is drought stress followed by excessive moisture; this fluctuation reduces the plant's uptake of calcium. Avoid blossom end rot by watering deeply on a regular basis, and mulching after established. **EXPOSURE:** Full sun, at least 6 hours per day. Temperatures below 55°F at night are required for fruit set. Night temperatures above 75°F in the summer inhibit fruit set.
FERTILIZER: Tomatoes are medium feeders and may benefit from fertilizer during the growing season if soil is deficient. When plants are small use a balanced, or nitrogen-rich fertilizer, switching to a fertilizer higher in phosphorus to encourage flower and fruit set. **SPECIAL CARE:** Do not much when weather is still cool; the roots of young plants need to be in soil that is warmed by the sun. When the weather warms up and plants are established, mulch to a depth of 2" or 3" with a material such as straw, leaves, or compost, to conserve moisture, reduce weed growth, and keep the roots warm. Place stakes or cages upon transplanting to avoid disturbing expanding roots later.
Harvesting: Cherokee Purple tomatoes are fully colored, and have a slight give when gently squeezed. Tomatoes may also be picked at the "set blue" stage, when 50% of the tomatoes' color has begun to change, and opened at room temperature without decreasing flavor or nutrition. Pick often and early increases yield, and decreases the risk of cracking and pest damage. Ripen susceptible to splitting.
 About 1 month before the average first fall frost, clip all blossoms and undersized fruit off the plant, single fruit before frost, and store them indoors in a single layer away from direct sunlight to ripen.
In the Kitchen
How to Store: Store tomatoes at room temperature in a single layer for a week or two depending on if they are picked ripe or bluish. Refrigeration changes the texture of fruit and can make them mealy.
 Illustrated by: Donna Clement

Your Average Last Day of Frost
 The average last day of frost (ALDF) is defined as "the first day in spring on which there is less than a 50% chance of frost." To determine your ALDF, call your local agriculture office or Cooperative Extension Service. Also inquire about the average date of the first fall frost.

PEPPER SWEET
California Wonder

Capsicum annuum



FROST SENSITIVE
75 DAYS from
transplanting
after last chance
of spring frost

HEIRLOOM
Two colors
on one plant!
Crisp and
flavorful,
excellent
for stuffing,
roasting,
grilling, or as
a snack. Very
productive
plant.



Botanical INTERESTS®

MELON

Papaya Dew

Cucumis melo (hybrid)

WARM SEASON
70-90 DAYS

Sow after
last chance of
spring frost

*Very unique!
Not a
honeydew or
a cantaloupe,
but so
delicious it
is sure to
become a
favorite.*



Botanical
INTERESTS®

BOK CHOY

Toy Choy

Brassica rapa var. *chinensis* (hybrid)

COOL SEASON
30-35 DAYS

Sow in
early spring or
late summer

*All the flavor
and crispness
of standard
varieties
in a small
package.
A beautiful
single serving
presentation.*



Botanical
INTERESTS®

PEA SNOW
Oregon Sugar Pod II

Pisum sativum



**FROST TOLERANT
60 DAYS**

Sow in early spring
and late summer

*Plenty of
delicious,
flat-podded,
stringless snow
peas from
short, disease-
resistant vines.
Enjoy the pods
in salads, as a
snack, and in
stir-fries.*



Botanical INTERESTS®

NASTURTIUM

Black Velvet

Tropaeolum minus

PERENNIAL (TENDER)
GROWN AS AN ANNUAL

**FULL SUN TO
PART SHADE**

Blooms late
spring to frost
10"–12" tall

*Striking, rich ruby
blossoms against
round, green
leaves create a
wondrous vision.
Contrast with
light-colored
flowers for
added drama!*



Botanical
INTERESTS®

SWEET PEA *Bouquet Blend*

Lathyrus odoratus

**ANNUAL
FULL SUN**

Blooms
spring/summer
5'–6' vines

*This captivating
blend has
longer, sturdier
stems and larger
flowers making
it ideal for a big,
sweet scented
bouquet.*



Botanical
INTERESTS®

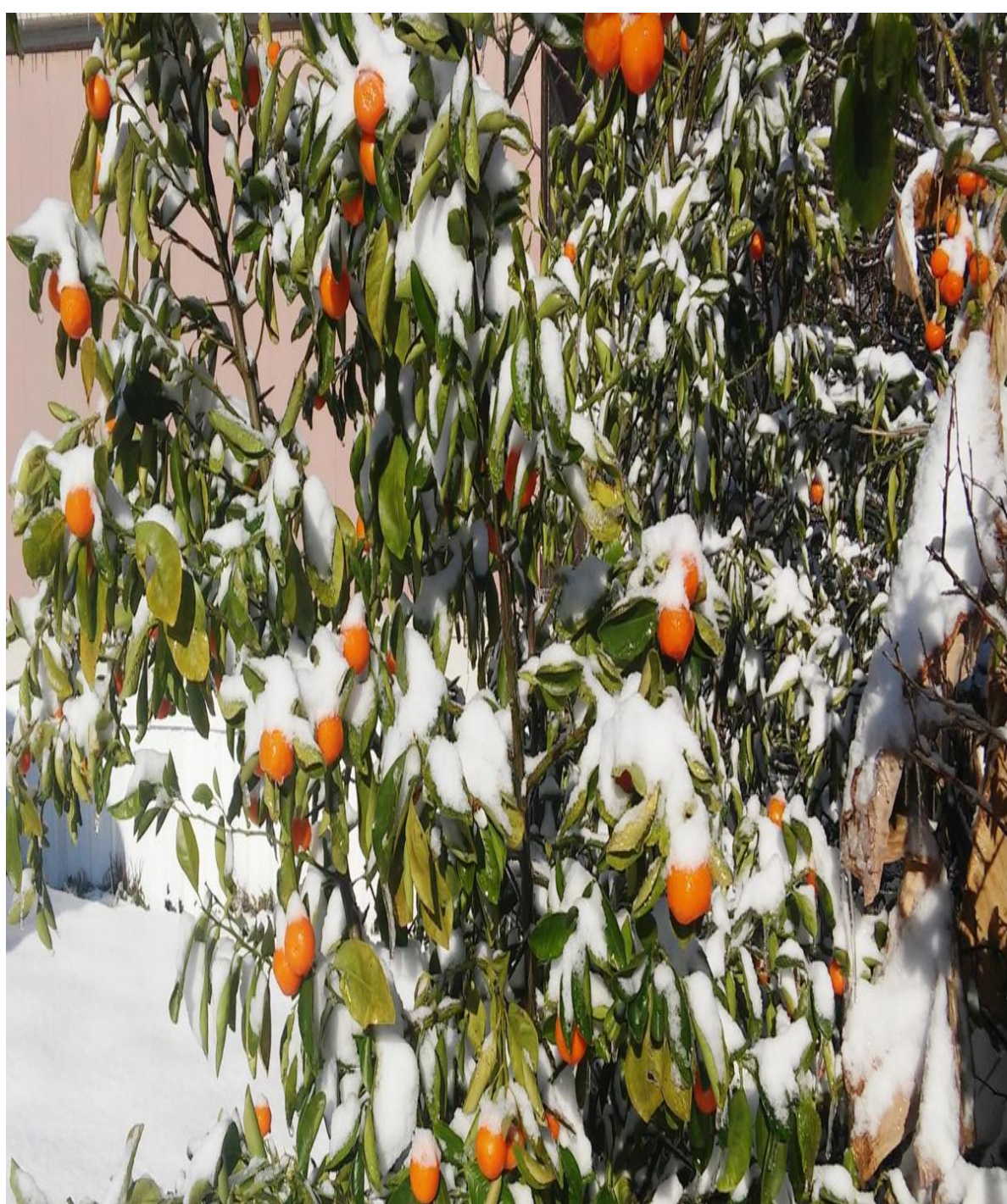


FROST SENSITIVE PLANTS

- Summer Annuals
- Tropical Perennials
- Citrus

COLD TOLERANCE OF CITRUS

- Limes $<30^{\circ}$
- Citron
- Lemons
- Sweet Oranges
- Grapefruit
- Mandarins
- Kumquat $<18^{\circ}$





COLD HARDY PLANTS

- Native Plants
- Cool Season Annuals
- In-Zone Non-Native Perennials
- Deciduous Fruit

CHILL REQUIREMENTS FOR DECIDUOUS FRUIT

- Fig & Pom's
- Low Chill: <300



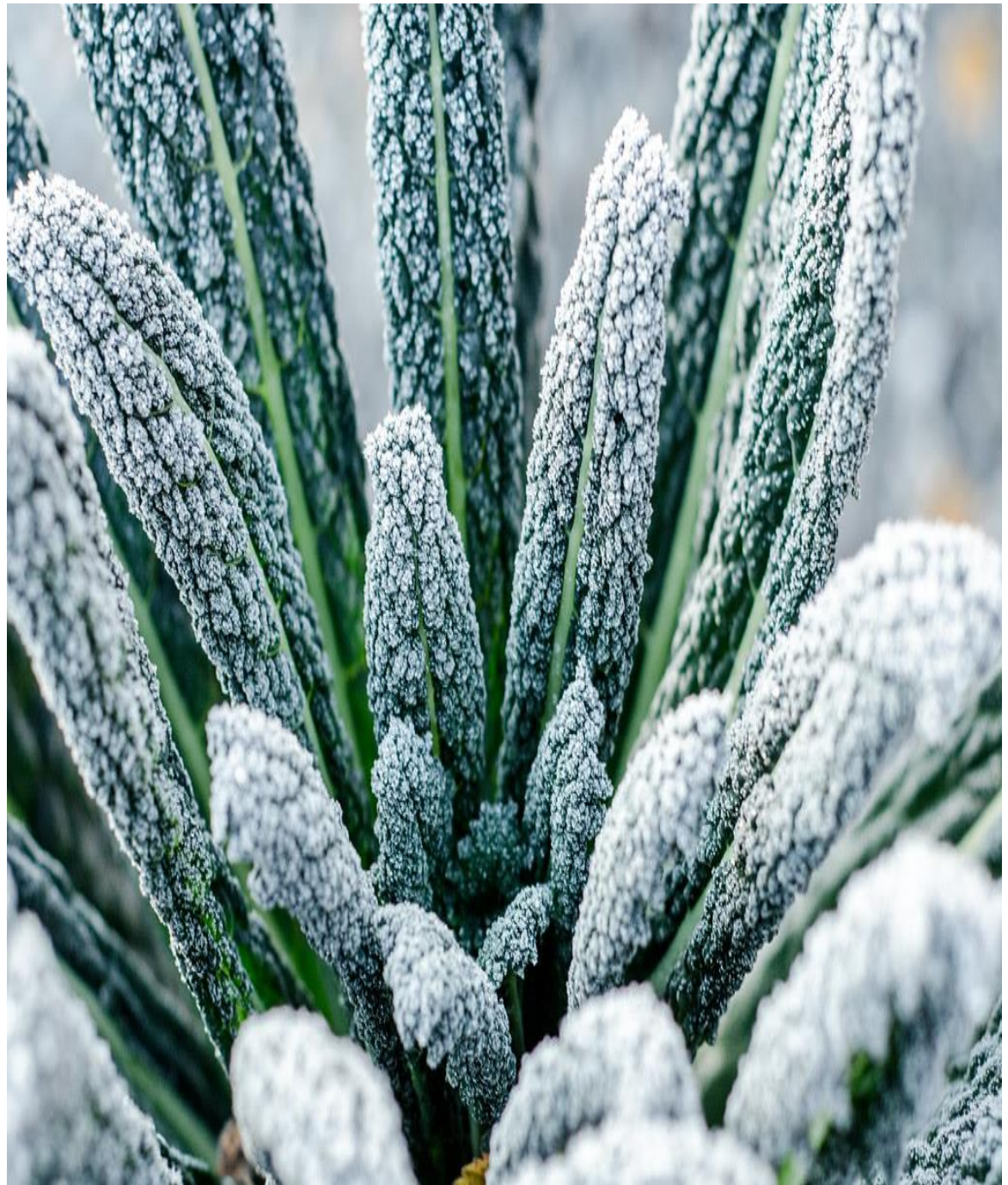


FROST OR FREEZE?

- Frost – Visible frost on foliage. Occurs when air temps under 36° drop below dew point

DEW POINT

- Dew Points above freezing temps are least likely to result in Frosts or Freezes





FROST OR FREEZE?

- Freeze – When air temperatures drop below freezing.

PREDICTING A COLD EVENT

- Duration
- Moisture (temp swing)
- Cloud Cover
- Wind Speed



Types of temperature inversion

Normal State of Atmosphere

Cool air

Warm air rises mixing with cool air causing atmosphere to become unstable

Warm air

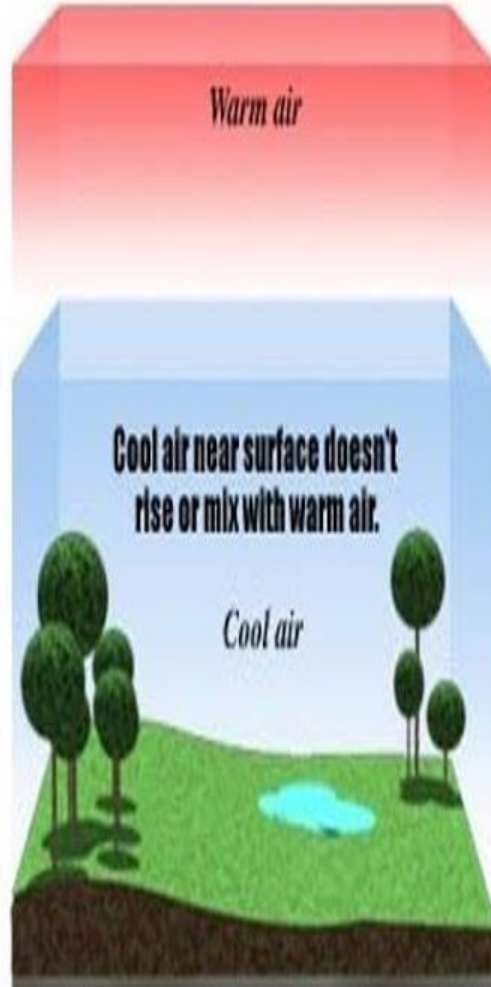


Temperature Inversion

Warm air

Cool air near surface doesn't rise or mix with warm air.

Cool air



Calm winds and the inversion result in poor air quality.



1 The winter sun, low in the sky, supplies less warmth to the Earth's surface.

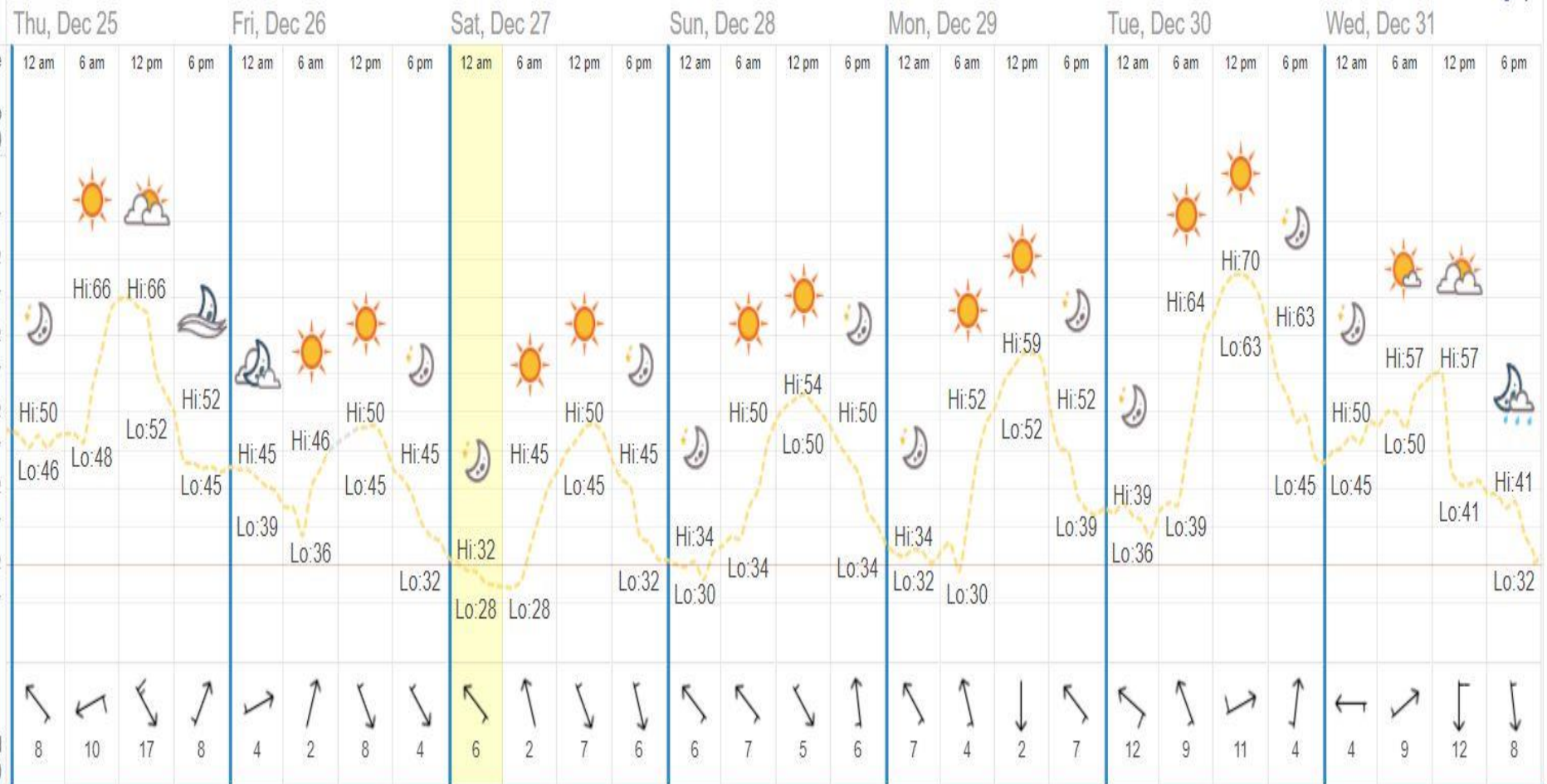
2 Warmer air aloft acts as a lid and holds cold air near the ground.

3 Pollution from wood fires and cars are trapped by the inversion.

4 Mountains can increase the strength of valley inversions



December 2014 Weather in Tucson — Graph



Saturday, December 27, 2014, 12:00 am — 6:00 am

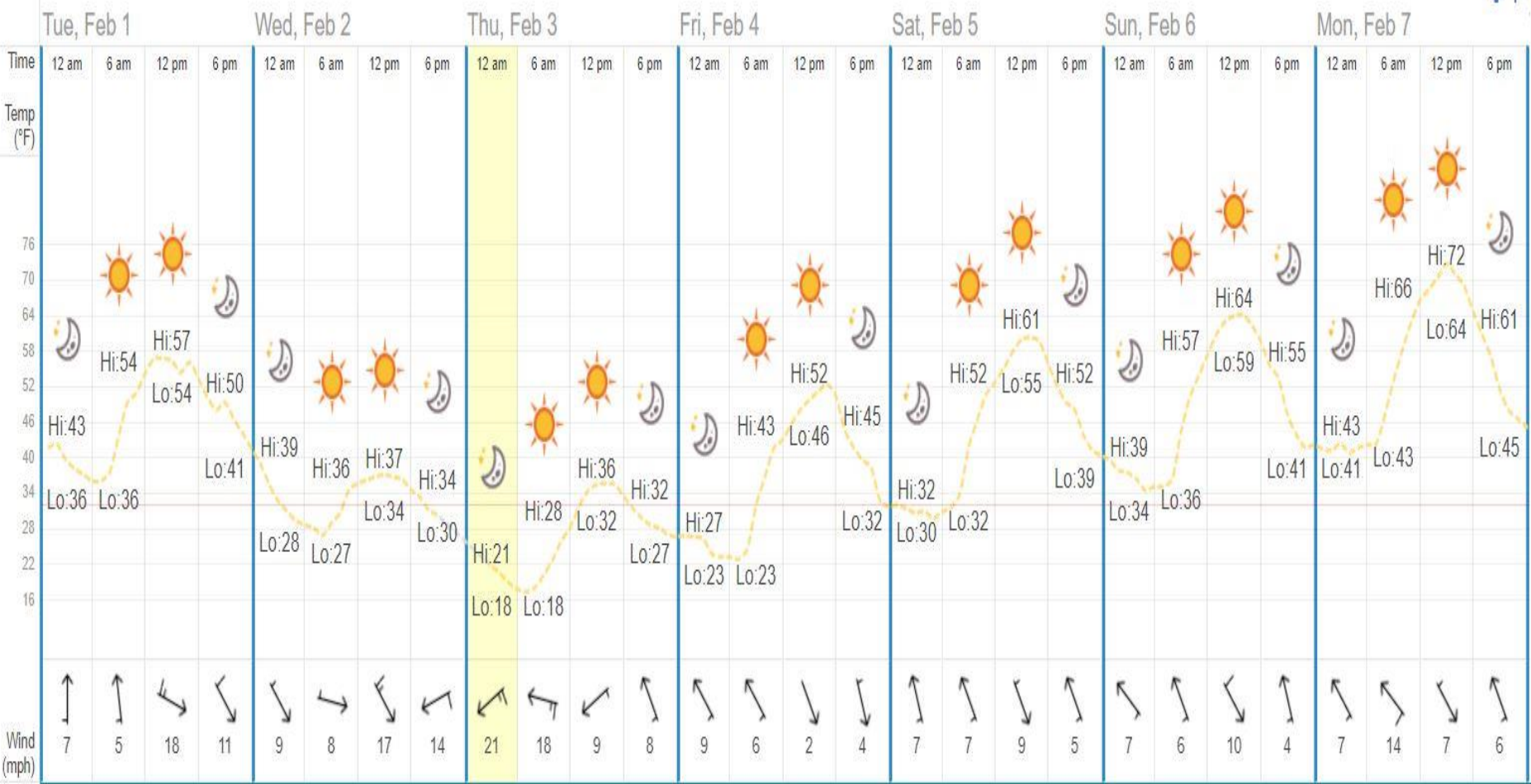


32 / 28 °F
Clear.

Humidity: 80%
Barometer: 30.1 "Hg

Wind: SE
5.593 mph

February 2011 Weather in Tucson — Graph



Thursday, February 3, 2011, 12:00 am — 6:00 am



21 / 18 °F
Clear.

Humidity: 28%
Barometer: 30.34 "Hg

ENE
Wind: 20.507 mph

PROTECTING PLANTS FROM DAMAGE

- Row Cover
- Frost Cloth
- Bed Sheets
- Boxes
- No Plastic Sheeting
- Top to Bottom or Build Frame





02/02/2013



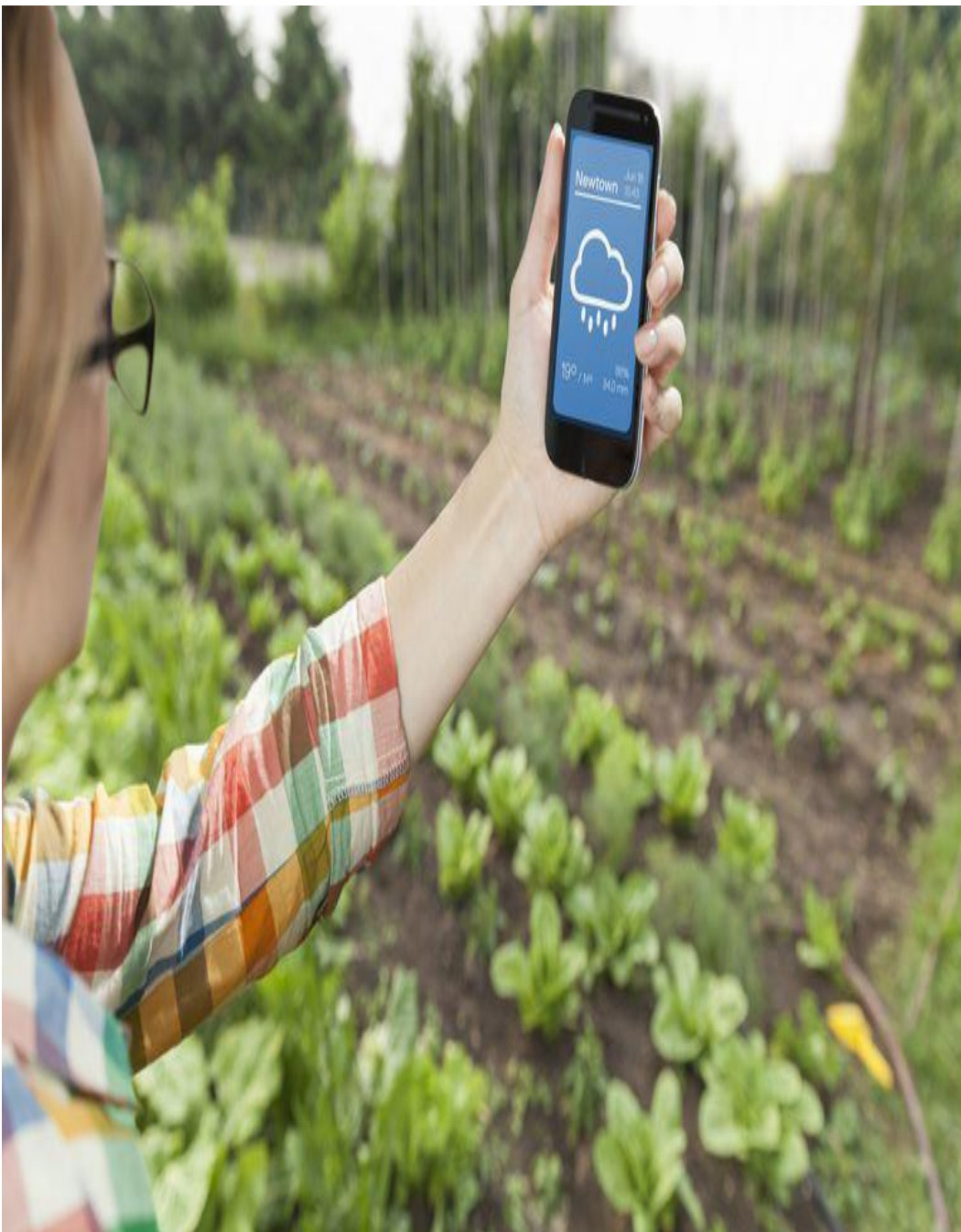
PROTECTING PLANTS FROM DAMAGE

- Water plants thoroughly a few days prior if possible
- Mist or spray down tree canopies
- Remove mulch from citrus trees
- Walls of Water

PROTECTING PLANTS FROM DAMAGE

- Incandescent Light Bulbs
- Christmas Lights
- Mechanic Lights
- Heat Lamps





WEATHER APPS

- NOAA
- Accuweather
- Weather Underground
- The Weather Channel
- Dark Sky
- Carrot Weather

ASK YOURSELF ...

- Does this plant need protection?
- How warm was it during the day?
- Is it windy?
- Is it cloudy?
- What is the Dew Point?
- Are you on a slope or in valley?
- Check the Weather!

RESOURCES

- Community Food Bank
- Tanks Green Stuff
- EcoGro
- Reading List
- Gardening Clubs
- Local Businesses
- Friends and Family





Thank you!

www.southwestvictorygardens.com/documents

(520) 576-7085