



WASHINGTON STATE UNIVERSITY
EXTENSION

The Resilient Yard

Adapting your yard to Climate Change

Mike Peronto

Pierce County
Master Gardener

WSU ENG



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WASHINGTON STATE UNIVERSITY
EXTENSION



Mission

Engaging university-trained volunteers to empower and sustain diverse communities with relevant, unbiased, research-based ***gardening & environmental stewardship*** education.



Speakers Bureau



Ask a MG



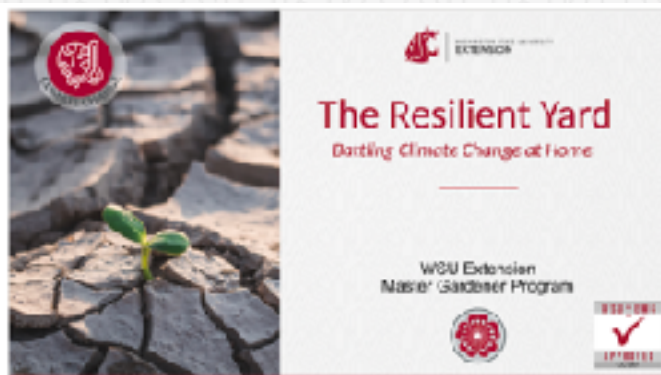
Demo Gardens



Youth Education



Climate Change Series:





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What can I do?



Three main areas where individuals can act:

- Your home
- Your car (transport)
- Your yard



Credit: Pixabay pxclimateaction-4684217

Contents:



Credit: WSU_EMG_T.Casson

Introduction & Overview:

- 'Climate Change 101'

The Suburban Yard

- The Lawn
- The Garden Beds
- The Kitchen Garden

New Homes:



Above Ground:

- Trees containing stored carbon

Below Ground:

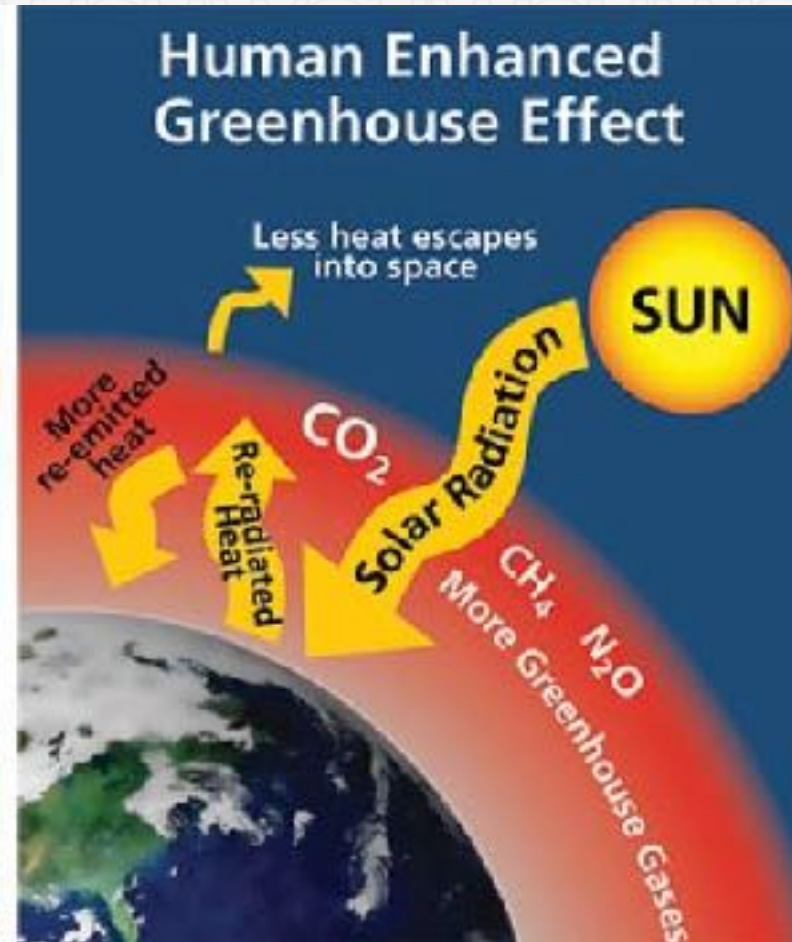
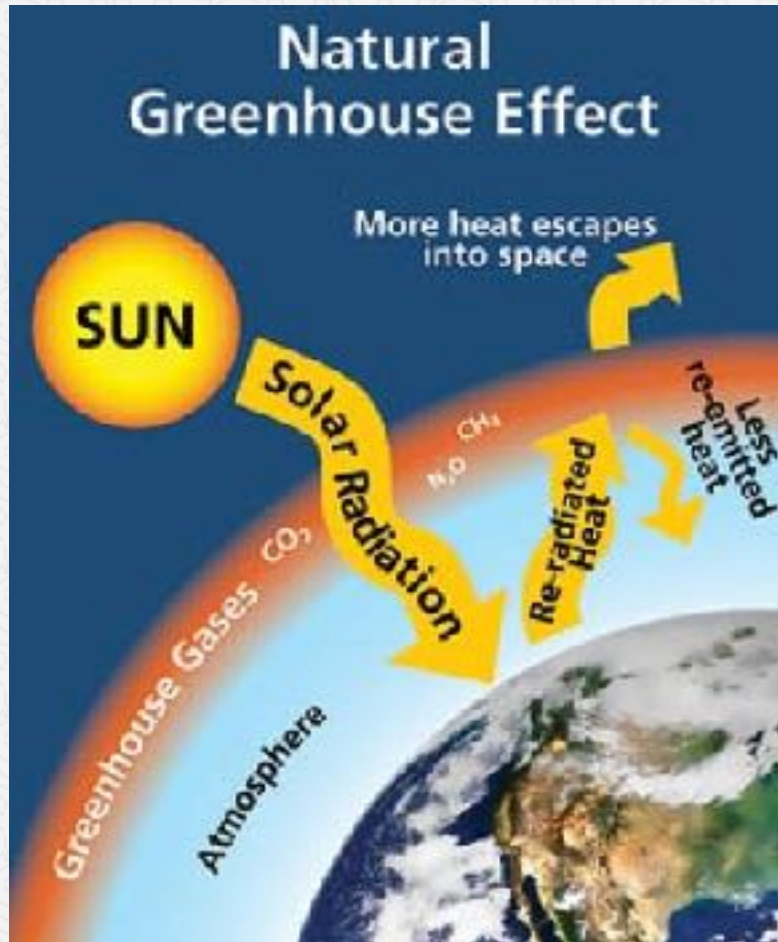
- Rich 'humus-y' soil
- Down to 'hard-pan'

*Everything is excavated and carted off.
Hundreds of years of 'stored carbon'... gone.*



Credit: WSU_EMG_M.Peronto

'Climate Change 101'



Greenhouse gasses act like a blanket & trap the heat from the sun.

Carbon Dioxide (CO₂) ~80%
Methane (CH₄) ~12%
Nitrous Oxide (N₂O) ~ 6%

Note: amount of carbon on earth does not change. It just changes from solid/liquid to gas. Gas is the issue.

<https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

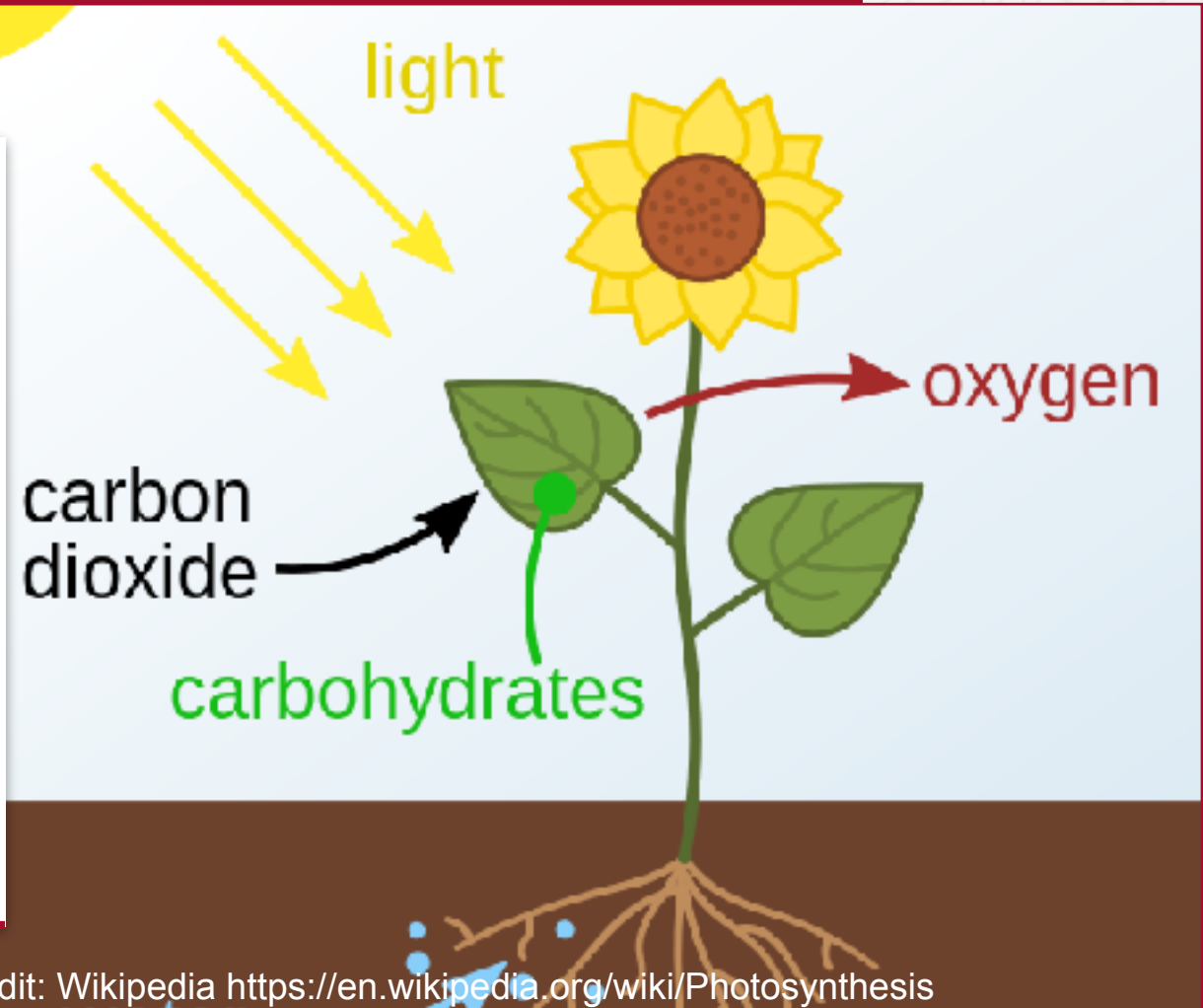
Photosynthesis!



Changes CO₂ from gas into carbon that can be stored:

- Plants convert CO₂ to carbohydrates
- ~70% feeds above ground (trunk, branches & leaves)
- ~30% root 'exudates' to accelerate...

*What Your Food Ate by David Montgomery & Anne Bickle



Credit: Wikipedia <https://en.wikipedia.org/wiki/Photosynthesis>

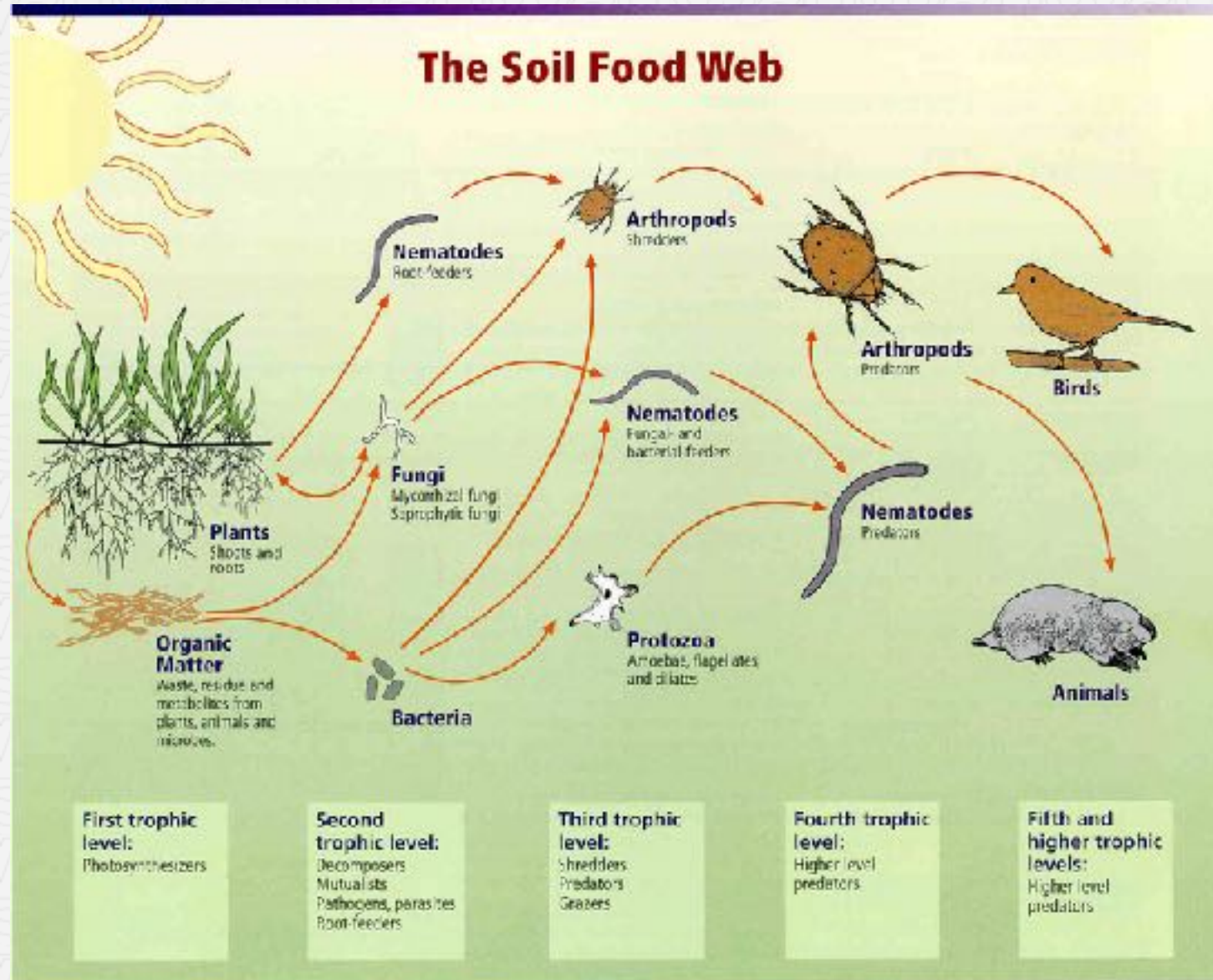
The Soil Food Web

Organisms in/on the soil comprise 59%* of all life.

- Critters
(Insects, earthworms, nematodes, etc.)
- Bacteria
- Fungi

*Once fed, these organisms
“do what living things do”*

*Growing a Revolution by David Montgomery



Relationships between soil food web, plants, organic matter, and birds and mammals
Image courtesy of USDA Natural Resources Conservation Service
http://soils.usda.gov/sqi/soil_quality/soil_biology/soil_food_web.html

Adding plants & compost:



Credit: pexels-photomix-company-1002703

- Builds & stores carbon in your soil and plants.
- Above ground (~40%)
- Below ground (~60%)

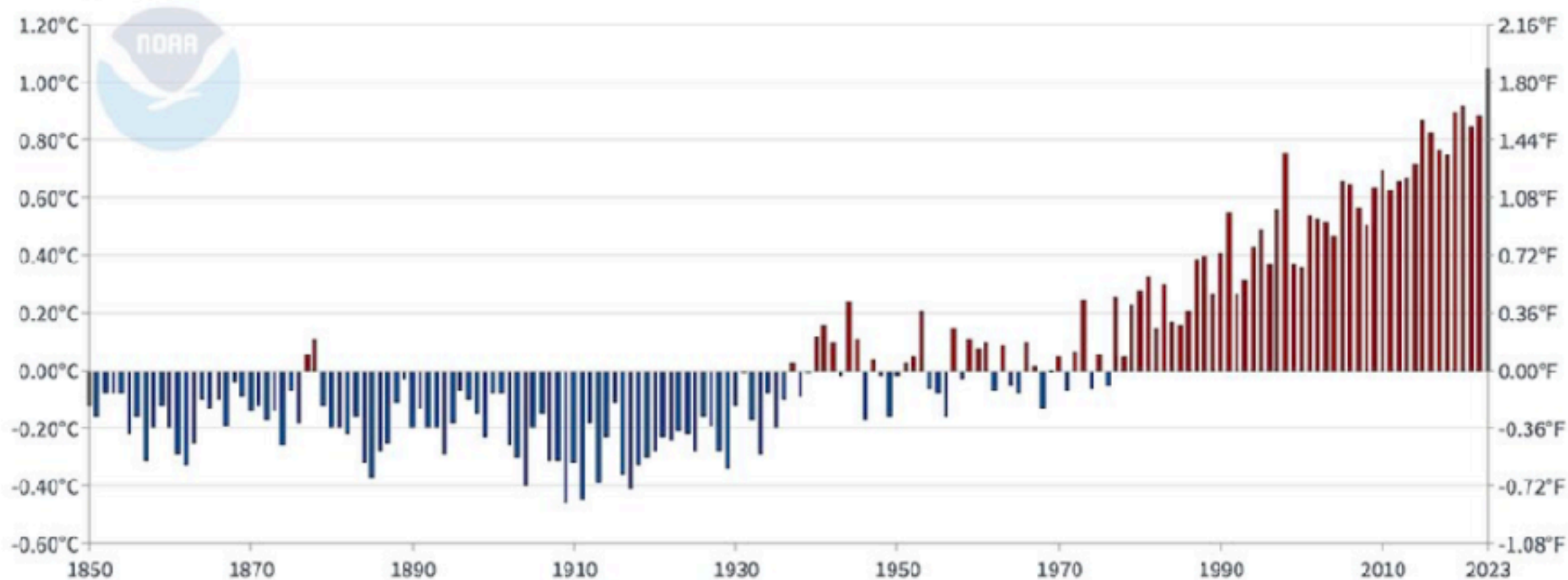
Strategy: accelerate & maximize these processes to the extent your yard will allow

**Growing a Revolution by David Montgomery*

Temp Trend: 175 years



Global Land and Ocean
June Temperature Anomalies





Maintaining your lawn

Primary strategy: generate less CO₂

Get rid of it!



Why?

- ~ 40 million acres across USA
- Monoculture
- Over-watered
- Chemically saturated

But

- 'American Dream'
- It *does* store carbon
- It *can* be responsibly maintained



Credit: WSU_EMG_T.Casson

If it stays:



Grow it long...let the clippings fall

Credit: Oregon State University

- Minimize CO2 emissions
- Reduce synthetic fertilizers
- Optimize watering

Ditch the gas powered tools



1 hr lawn mower use



driving 300 miles
from LA to Vegas



1 hr leaf blower use



driving 1100 miles
from LA to Denver

- Trimmers, edgers & blowers:
go electric
- Mowers:
electric or reel

If you employ a Yard Service...
Time to have “The Talk”
... switch to electric

CARB California Air Resources Board

#10 King in'20 = 519,900,000 pounds of CO₂e !

Source: Lawn Care Goes Electric

Reduce Chemical Inputs:

Fertilizer:* from 4 to 2 times/year

- Let nitrogen rich clippings drop
- Add compost

Moss killers and “Weed &” products

- Stop! (Add lime instead)
- Thatch & pull

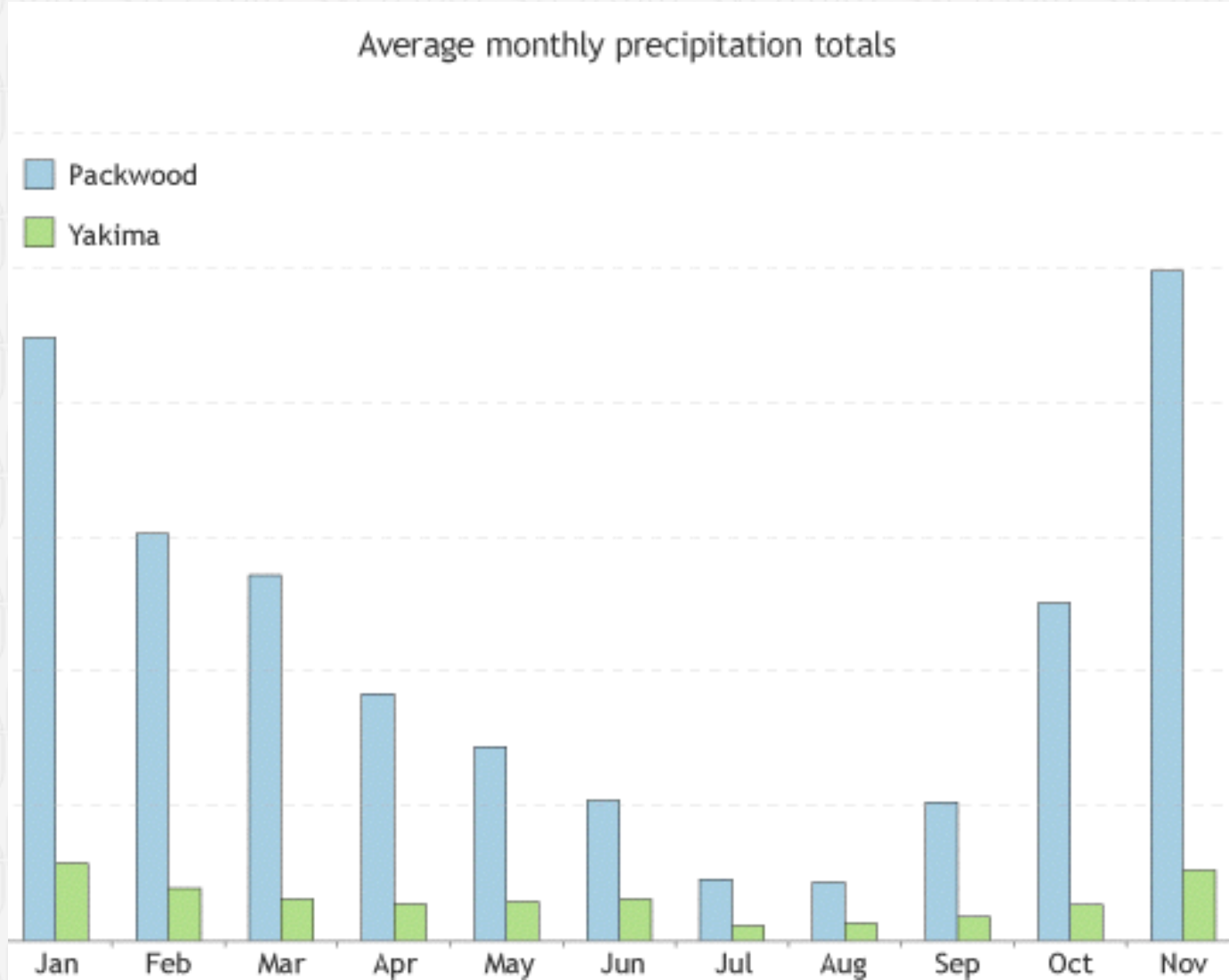
Lawn w/major issues?
Master Gardener Program



* Synthetic fertilizer: 4-6 lbs CO₂e for every 1 lb used

David Wolfe, professor of plant and soil ecology, Cornell University

Western WA Water

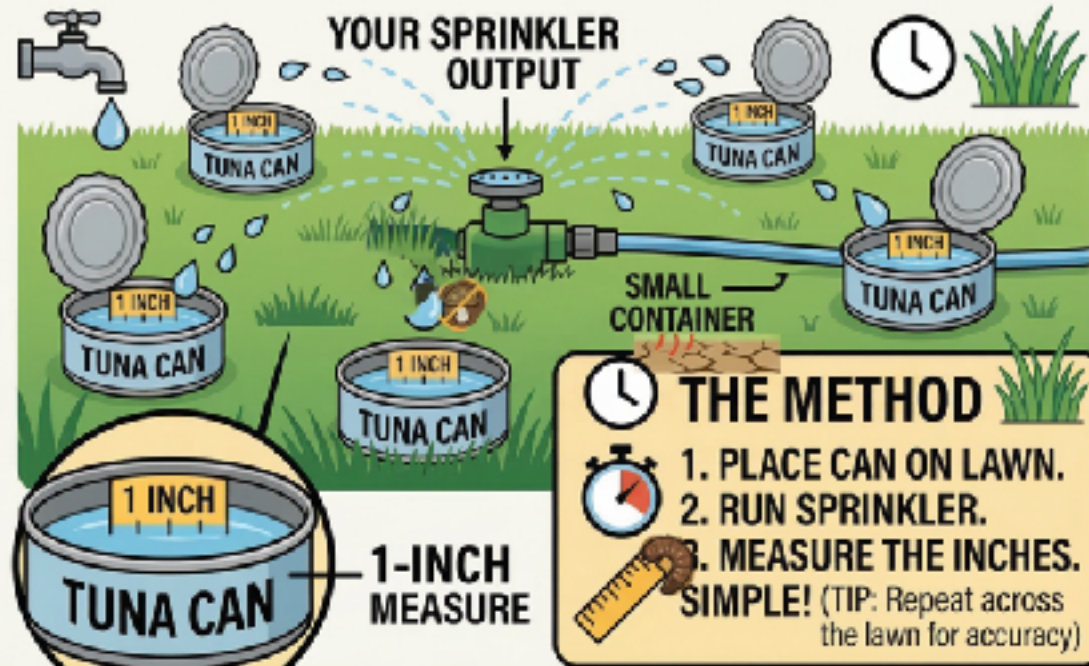


Water 'Deeply & Infrequently'



LAWN WATERING: THE TUNA CAN MEASURE

HOW MUCH
WATER?
MOST LAWNS
NEED ABOUT:
1 INCH
OF WATER
PER WEEK



Irrigation:

- Water savers, IF
- Adjusted frequently
- Audit your service provider



Lawn Summary:

- Grow it long
- Electric powered tools
- Reduce the chemicals
- Optimize the watering

Bonus: get & use Yard Waste Recycling

Methane! 80x worse than CO₂



Redesigning your garden beds

Primary strategy: maximize CO₂ capture & storage

Sun's-eye view

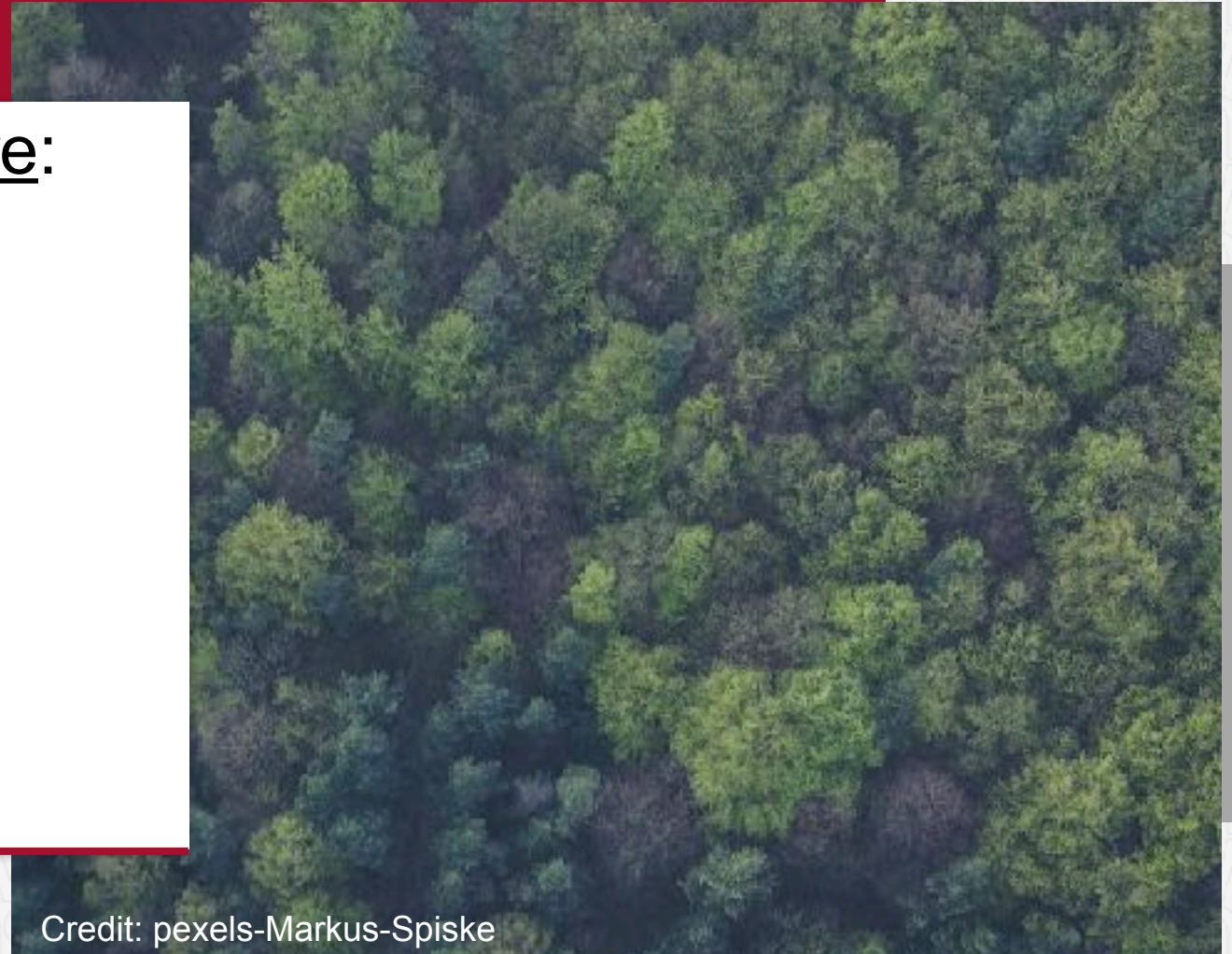


Maximizing CO2 capture:

- ◉ Leaf-capture of sun's rays
- ◉ From spring through fall
- ◉ Leaving little bare soil

*Photosynthesis &
Soil Food Web*

*Water retention &
weed control*



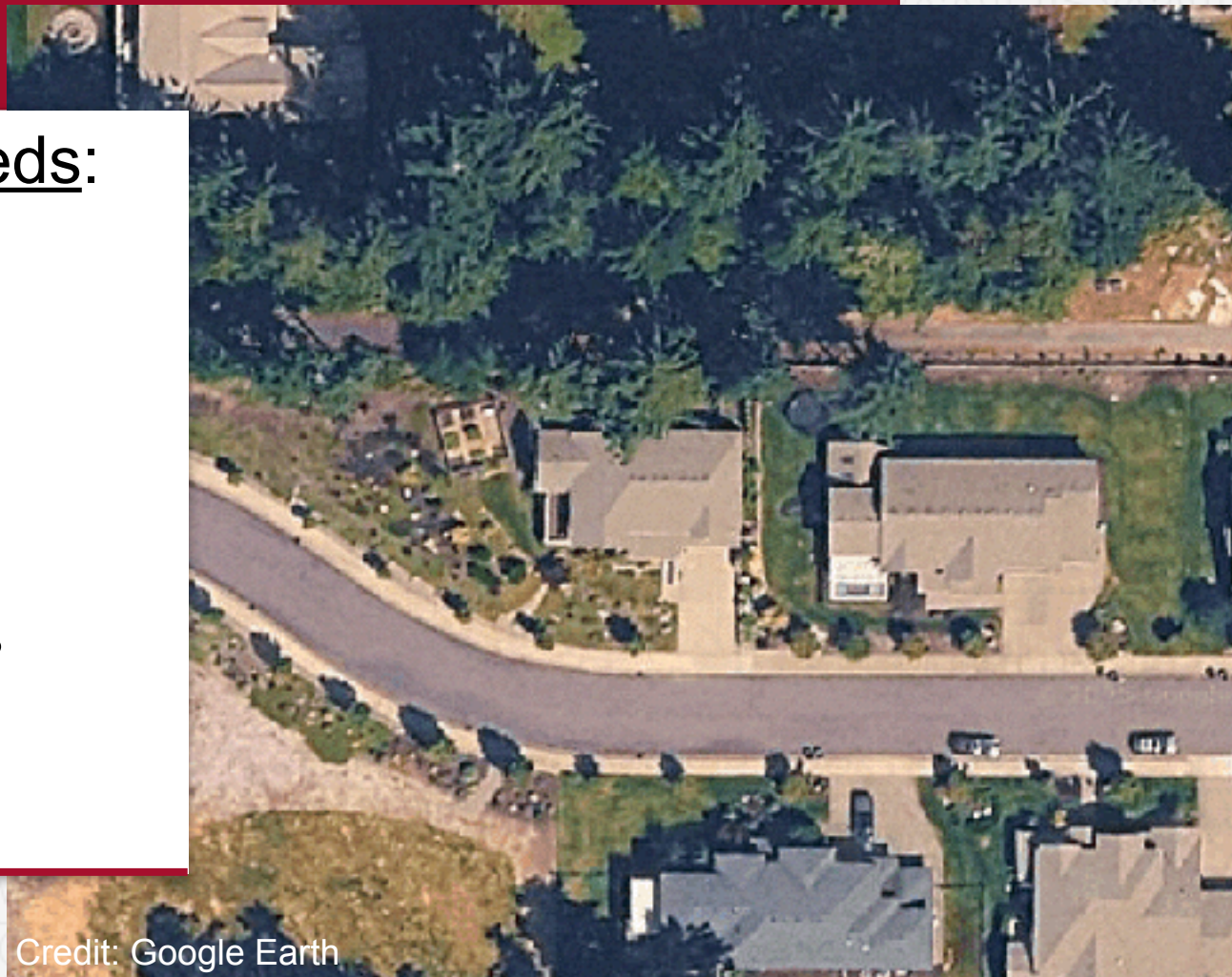
Credit: pexels-Markus-Spiske

Sun's-eye view



Applied to your garden beds:

- Expand beds (vs. lawn)
- Add plants to 'gaps'
- Goal: 'forest like' coverage, spring through fall
- While maintaining sight lines



Credit: Google Earth

Analyze beds: pick one to upgrade



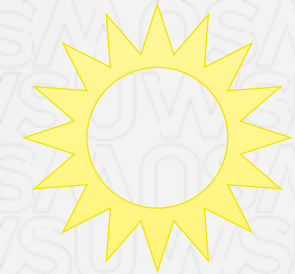
Credit: Google Earth

Different Plants for beds:

- North - full shade
(time of year exceptions)
- East - morning sun
- South - full sun
(bank shot)
- West - setting sun

Full Sun.... To Western Exposure..... To Eastern Exposure..... to Full Shade

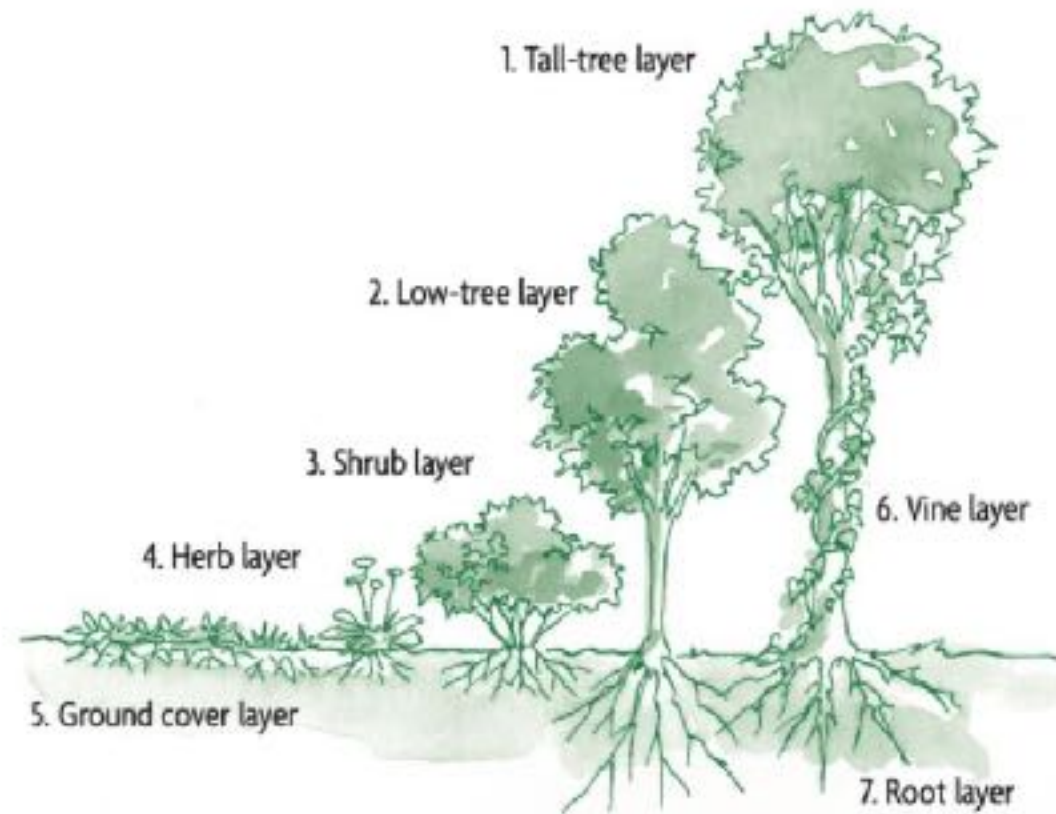




The layers:

- Trees
 - Shrubs
 - Ground Covers
-
- Tallest to smallest
 - North to south
 - No wildfire ladders

Vertically, horizontally & across time



The seven layers of the forest garden.

<https://www.chelseagreen.com/2023/designing-a-forest-garden-the-seven-story-garden/>

Diversify your planting

- ◉ Reduces climate risk
- ◉ Improves coverage across space & time
- ◉ Attracts predators



Credit: WSU_EMG_Peronto

- ◉ Fewer pests
- ◉ Fewer weeds
- ◉ Less fertilizer
- ◉ Improved water retention



Credit: WSU_EMG_Casson

Through the seasons...

Spring:

- Amend soil with compost
- Plant shrubs & ground covers
- Vertical, horizontal, over time

Fall:

- Upgrade second bed?
- Leaf-fall on beds, mulch for winter

Summer:

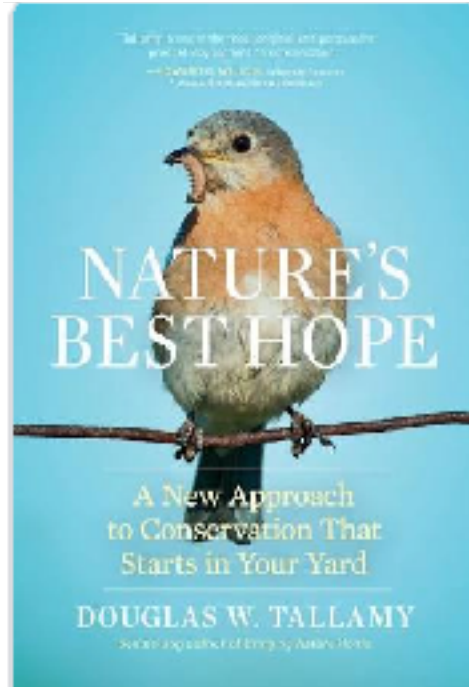
- Mulch to prevent evaporation
- Water deeply & infrequently

Winter:

- Cover bare soil
- Plant trees in late winter
- Plan: spring's bed improvements



Douglas W. Tallamy
Univ. of Delaware
Wildlife Ecology



Our National Parks, are too small and separated to preserve native species.

- Shrink the lawn
- Remove invasives
- Plant Keystone Plants
- Do not spray or fertilize



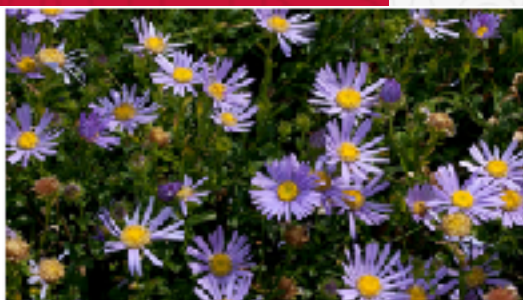
Keystone Plants

Tip Sheet



Sunflower

Many varieties. In the *Helianthus* genus.
49 caterpillar species use this as a host.
50 bee species rely on this plant.



Aster

In the *Symphyotrichum* genus.
3 caterpillar species use this as a host.
33 bee species rely on this plant.



Goldenrod

Many varieties. In the *Solidago* genus.
49 caterpillar species use this as a host.
42 bee species rely on this plant.



Curlycup gumweed

Many varieties. In the *Grindelia* genus.
9 caterpillar species use this as a host.
31 bee species rely on this plant.



Western Coneflower

In the *Rudbeckia* genus.
4 caterpillar species use this as a host.
29 bee species rely on this plant.

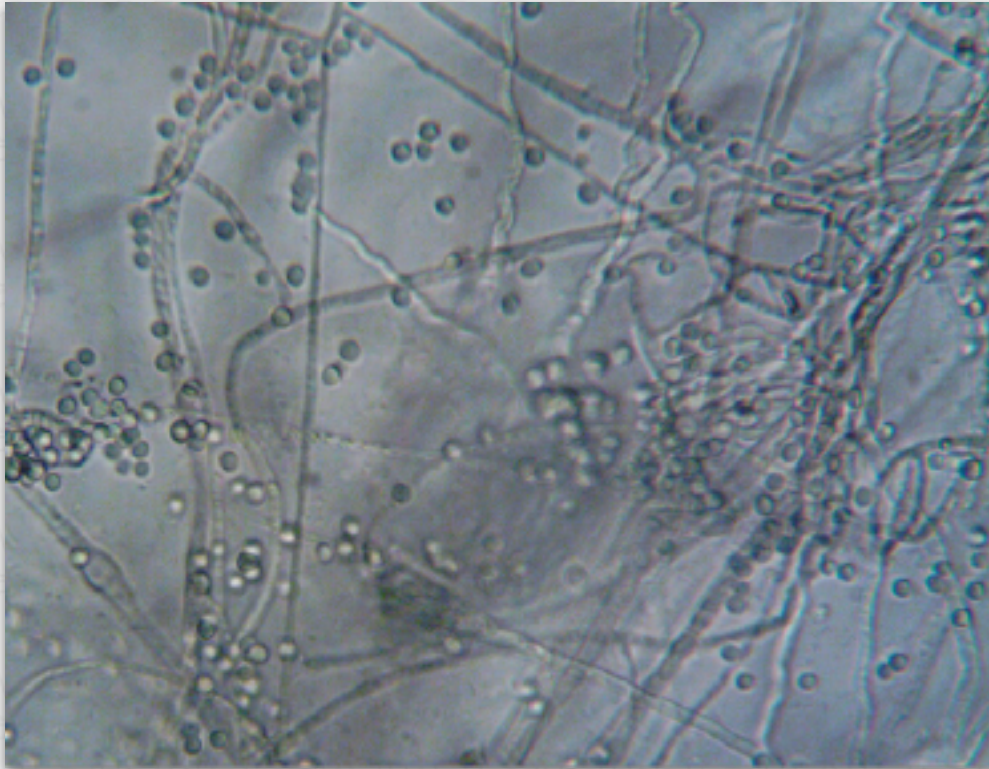


Hairy False Golden Aster

In the *Heterotheca* genus.
7 caterpillar species use this as a host.
24 bee species rely on this plant.

Summary:

“The Internet of soil”



The Hyphae of Mycorrhizal Fungi

Resilience:

- Organically rich soil:
 - Holds water
- Deeply rooted plants:
 - Survive hot spells
- Diverse & tight plantings
 - Preserve water
 - Reduce soil temperature
 - Keep pests in check
- Minimize chemicals
 - Fewer 'unintended consequences'

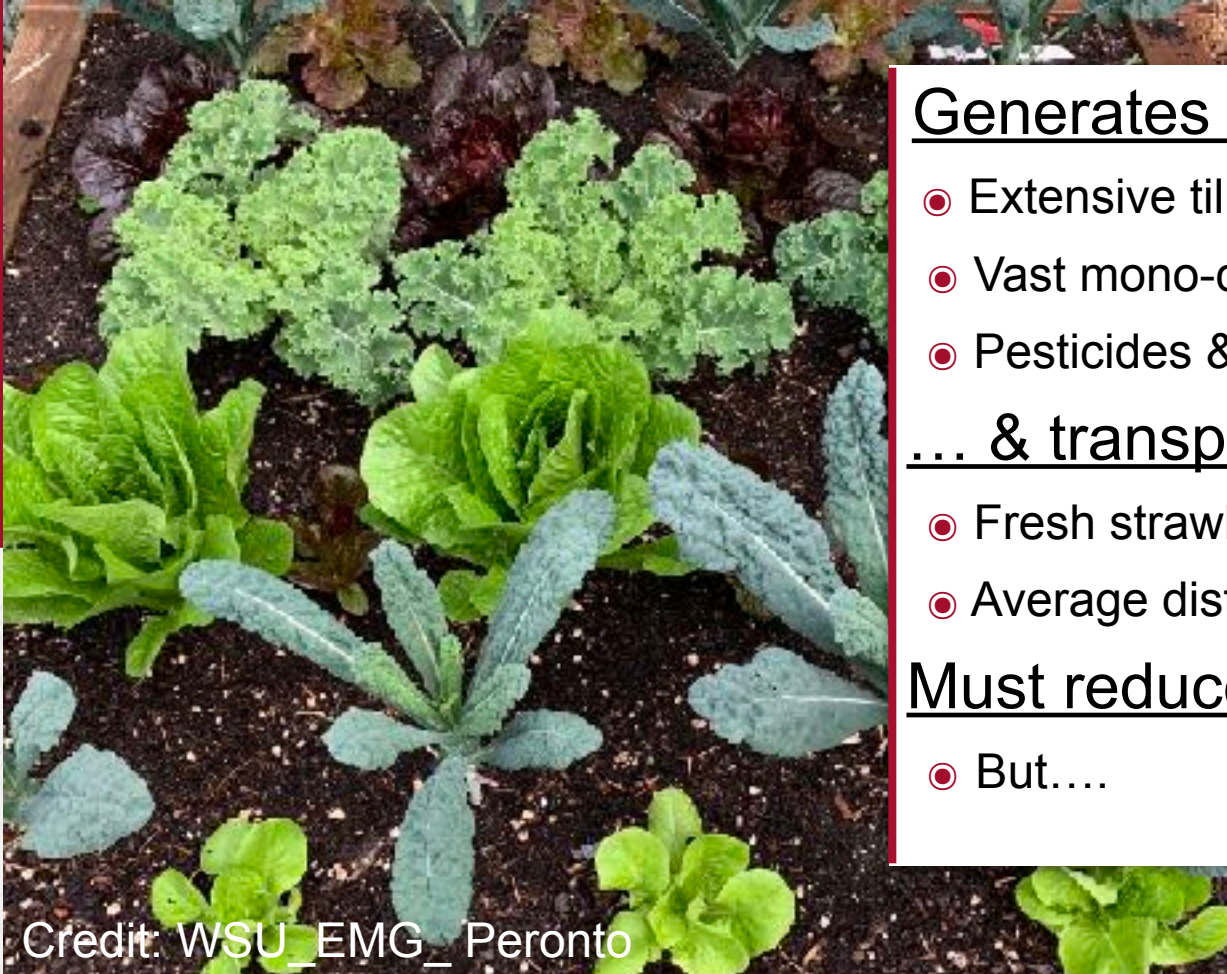


Start a Kitchen Garden

The new 'Victory Garden'

Why kitchen gardens

Commercial Agriculture...



Credit: WSU_EMG_Peronto

Generates tons of CO₂ in growing...

- Extensive tilling
- Vast mono-crops
- Pesticides & herbicides

... & transport: long supply chains

- Fresh strawberries in January!
- Average distance farm to table 1,494miles

Must reduce their CO₂ output

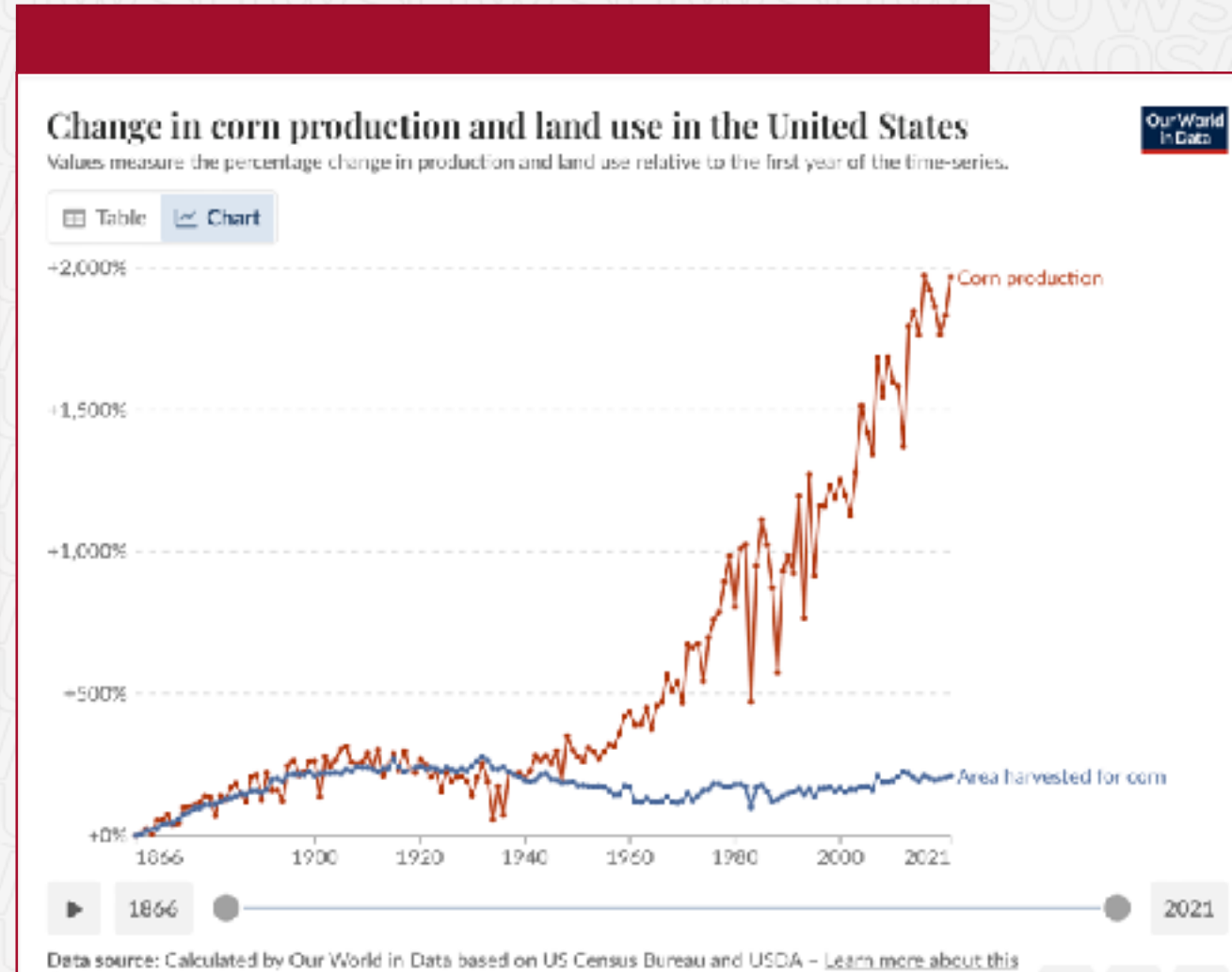
- But....

Productivity:



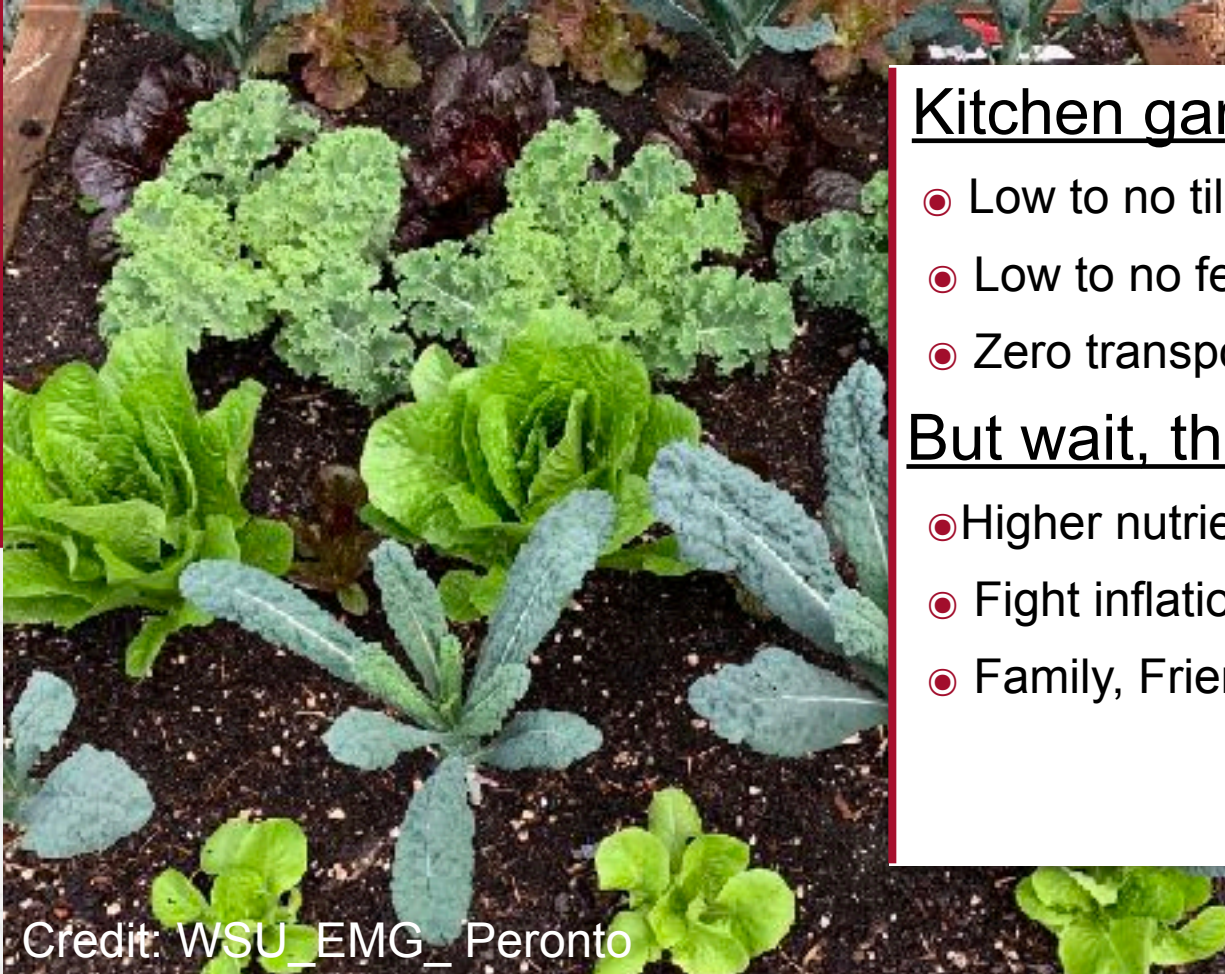
'Green Revolution':

- Vast increases in production/acre
- 8+ billion people to feed
- Low CO₂ practices must be as productive
- Or, cut down more forests



Why kitchen gardens

Back to those 40million acres...



Credit: WSU_EMG_Peronto

Kitchen gardens: CO₂ profile

- Low to no tilling
- Low to no fertilizers, pesticides & herbicides
- Zero transport emissions

But wait, there's more!

- Higher nutrient profile than store bought
- Fight inflation
- Family, Friends, Food-bank



The Resilient Yard

Battling climate change at home

Lawns

Minimize CO2

Garden Beds

Maximize CO2 Capture

Kitchen Garden

De-stress Supply Chains

***You cannot do all the good the world needs...
But the world needs all the good you can do***

Questions?

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<http://mastergardener.wsu.edu/>

<https://www.facebook.com/WSUMGProgram>



Resources:



Print Publications

(Author; *Title*; Publication Date; Publisher; ISBN)

- ▶ **David Montgomery & Anne Bickle; *What Your Food Ate*;**
Published in 2023 by W.W.Norton & Company. ISBN-10 1324004533
- ▶ **David Montgomery; *Growing a Revolution*;**
Published in 2017 by W.W.Norton & Company;
ISBN 978-0-393-60832-8
- ▶ **Dale Strickler; *Restoring Your Soil*;**
Published in 2021 by Storey Publishing; ISBN 978-1-63586-224-9
- ▶ **Douglas W. Tallamy, *Nature's Best Hope***
Published in 2019 by Timber Press. ISBN 978-1-60469-900-5
Website

Online Sources

(Publishing Site; *Title*; Author; Date Accessed; url *where information is available*)

- ▶ **California Air Resources Board; *Small Offroad Engines in California*;**
accessed September 8, 2023, archived at <https://web.archive.org/web/20230908133913/https://ww2.arb.ca.gov/sites/default/files/2021-12/2021%20SORE%20Fact%20Sheet.pdf>.
- ▶ **Environment America; *Lawn Care Goes Electric*;** U.S.PIRG Education Fund; Frontier Group; 2023. <https://environmentamerica.org/center/resources/lawn-care-goes-electric/>

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