Cultivating Carbon In Your Home Garden

City Of Northfield Minnesota

St. Olaf Environmental Studies 237, Spring 2020
Duncan Burnett, Luke Everson, Lisa Fisher, Kendal Otness

Northfield Climate Action Plan to Reduce Carbon Emissions

Goals:

- 100% carbon free electricity by 2030
- 100% carbon free community by 2040

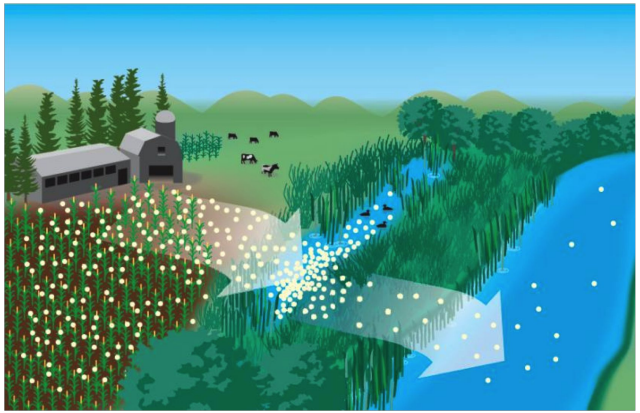
How gardening pertains to the CAP:

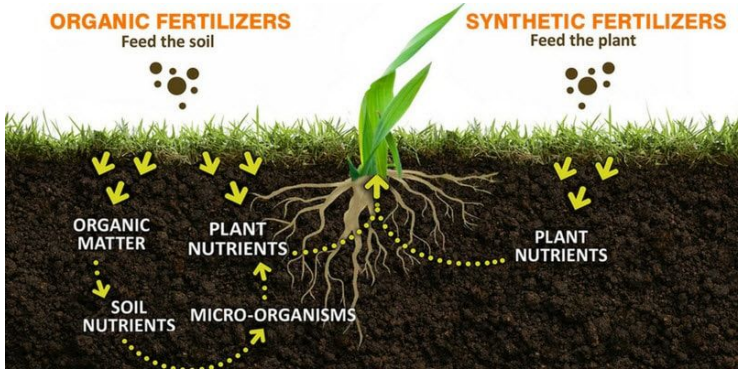
- Targets of soil restoration, tree planting, sustainable land-use, and zero-waste
- GreenStep City goals improved by gardening: Efficient Existing Private Buildings, Design for Natural Resource Conservation, Sustainable Purchasing, Community Forests and Soils, Stormwater Management, Sustainable Consumption and Waste, and Benchmarks and Community Engagement
- Planned emissions reductions from Residential Efficiency and Waste Strategies

City Of Northfield Minnesota

1. Reduce Synthetic Fertilizers

- While all fertilizers help plants grow, organic fertilizers, such as compost, increase the organic matter in soils and release nutrients slowly over longer periods
- Organic fertilizers are also less likely to runoff into surface waters compared to synthetic fertilizers which runoff easily and contribute to algal blooms, reducing water quality
- Synthetic fertilizers kill microorganisms who are key members of the ecosystem and have the essential role of converting dead organic matter into nutrient rich usable matter
- Synthetic fertilizers also have negative effects on humans and animals who are exposed to it





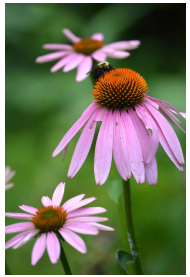
2. Plant Native Perennials

- There have been major losses in soil carbon stocks due to loss of prairie to land development
- Planting diverse native perennial species with deep roots increases the carbon soils can store
- Planting Native perennials supports diverse pollinators with excellent food resources

List of prairie wildflowers provided by the University of Minnesota Extension:

- Butterfly weed (*Asclepias tuberosa*)
- Blue false indigo (*Baptisia australis*)
- Purple coneflower (*Echinacea purpurea*)
- Oxeye (*Helianthus helianthoides*)
- Meadow blazing star (*Liatris pycnostachya*)
- Hoary puccoon (*Lithospermum canescens*)
- Wild lupine (*Lupinus perennis*)
- Large-flowered beardtongue (*Penstemon grandiflorus*)
- Prairie phlox (*Phlox pilosa*)
- Grey-headed coneflower (*Ratibida pinnata*)
- Black-eyed Susan (*Rudbeckia hirta*)
- Cup plant (*Silphium perfoliatum*)



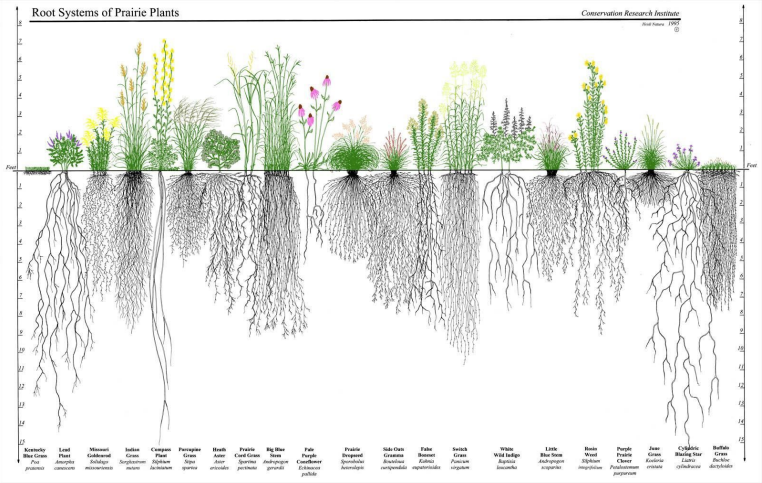



3. Select Plants High in Biomass

- Grasses tend to be high in biomass and create well-established root systems that store carbon
- Require very little maintenance and are great for improving soil health

List of prairie grasses provided by the University of Minnesota Extension:

- Big bluestem (*Andropogon gerardii*)
- Little bluestem (*Schizachyrium scoparium*)
- Sideoats grama (*Bouteloua curtipendula*)
- Blue grama (*Bouteloua gracilis*)
- Canada wildrye (*Elymus canadensis*)
- Switchgrass (*Panicum virgatum*)
- Indian grass (*Sorghastrum nutans*)



4. Compost

- **What**: A form of waste management in which organic matter, such as food waste, is broken down by bacteria and fungus to create a nutrient-rich soil additive.
- **Why**:
  - It reduces the amount of waste in landfills by over a quarter, allowing organic matter to return to the earth instead of decompose in plastic trash bags, releasing prominent greenhouse gases
  - It provides soil with naturally occurring nutrients, cutting the need for the production and transportation of fertilizers
  - It helps plants grow faster, increasing the amount of carbon they take out of the atmosphere
- **How**: visit nrcs.usda.gov and search “composting” for 8 easy steps!
  - If you can’t compost for your own lawn, Northfield has Curbside Composting! Just dump your compost in a provided bucket to drastically reduce your carbon footprint

5. Utilize Local Resources

- In addition to using your own compost as fertilizer, consider what other local resources you can use in order to reduce your carbon footprint and save money!
- Incorporating a rain barrel or other rainwater harvesting system for watering your garden, trees or lawn can reduce your utility bill while cutting back on the energy used to treat and transport water.
- Local City of Northfield wood chips and compost may also help you cut back on the amount of space you need to mow and eliminate the transport costs necessary when we use materials from further away.

Now test your knowledge!

Which of the images below are the best ways to cultivate carbon in your home garden?

A

B

C

D

E

Answer: A, D, E

Now test your knowledge!

For cultivating carbon...

Which yard is the best?

Which yard is worst?

A B C

Answer: Best is B, Worst is A

Resources to Learn More

Lists of Native Perennials and Grasses
Minnesota Native Species (University of Minnesota), visit: https://extension.umn.edu/find-plants/native-plants
Prairie Grasses and Perennials (University of Minnesota), visit:
https://extension.umn.edu/planting-and-growing-guides/planting-and-maintaining-prairie-garden

Composting
How to compost, visit:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/features/?&cid=nrcs143_023537
Northfield Curbside Composting, visit: https://www.northfieldcompost.com/
Northfield Compost Site, visit: https://www.ci.northfield.mn.us/336/Organics-RecyclingComposting

Places to Obtain Locally Sourced Materials near Northfield
Northfield Compost Site: mulch and compost

Connect With the Northfield Gardening Club: http://www.thenorthfieldgardenclub.org/
Northfield Climate Action Plan: https://www.ci.northfield.mn.us/1306/Sustainability

5 Tips For Capturing Carbon in Your Home Garden

Reduce Synthetic Fertilizers

Increasing carbon sequestration first requires reduction of carbon heavy products in our gardens and our lawns. One of these carbon heavy products is synthetic fertilizer. These fertilizers not only use loads of carbon in their production but can also runoff into local water bodies! Alternatives such as compost can greatly reduce your carbon footprint!

1

Plant Native Perennials

Increase the carbon in your garden soils by planting native species. Most of these species require very little care, and their root systems help hold rainwater and increase soil health. Consider planting native perennials in your home garden such as those listed in our presentation.

2

Select Plants High in Biomass

In addition to native trees and shrubs, native grasses can store large amounts of carbon above and below ground in their roots. Consider planting little or big bluestem or other native grasses in your yard. Many of these can be purchased at your local gardening store.

3

Compost Food and Yard Waste

Composting can reduce CO_2 in the atmosphere by 2.1-3.1 gigatonnes[1], just by limiting methane emitted by food waste in landfills (this is equal to driving *over 5.3 billion* miles[2]).

Creating your own compost bin is easy! Visit nrcs.usda.gov and search “composting” for step by step instructions!

4

Utilize Local Resources

In addition to home compost fertilizer, local city available wood chips and installing a rainwater harvest system, can reduce energy usage while helping to care for your trees, garden and lawn.

5

Additional Resources

Northfield Gardening Club
University of Minnesota Extension Native Species and Prairie Information
Northfield Curbside Composting
Environmental Protection Agency: EPA.gov/recycling/composting
Northfield Compost Site for local materials

ST. OLAF COLLEGE
Duncan Burnett, Luke Everson, Lisa Fisher, Kendal Ottness
St. Olaf College Environmental Studies Integration and Application Course, Spring 2020

Northfield Climate Action Plan

References

Composting. (2020). Retrieved from https://drawdown.org/solutions/composting.

Gardening, Healthy Soil, and Carbon Sequestration. (2018, January 15). Retrieved from https://www.ecolandscaping.org/01/developing-healthy-landscapes/climate-change/gardening-healthy-soil-carbon-sequestration/.

Gilani, N. (2016). The Effects of Synthetic Fertilizers. Retreived from https://homeguides.sfgate.com/effects-synthetic-fertilizers-45466.html

Greenhouse Gas Equivalencies Calculator. (2020, March). Retrieved from https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

Judith D. Schwartz, Judith D. Schwartz, Judith D. Schwartz, Schwartz, J. D., Schwartz, J. D., Robbins, J., Marinelli, J. (2014). Soil as carbon storehouse: New weapon in climate fight? Retrieved from https://e360.yale.edu/features/soil_as_carbon_storehouse_new_weapon_in_climate_fight

National Overview: Facts and Figures on Materials, Wastes, and Recycling. (2020, March 13). Retrieved from https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials.

Planting and maintaining a prairie garden (2020). Retrieved from https://extension.umn.edu/planting-and-growing-guides/planting-and-maintaining-prairie-garden

Platt, Brenda. (2016, April 26). The Benefits of Composting and Compost Use. Retrieved from https://ilsr.org/benefits-composting-compost/.

Rainwater Harvesting. (2020). Retrieved from https://www.bluebarrelsystems.com/blog/environmental-benefits-of-rainwater-harvesting/

Sustainability: Northfield, MN - Official Website. (n.d.). Retrieved from https://www.ci.northfield.mn.us/1306/Sustainability.