



Spring 2026

NEWSLETTER

Atlantic Master Gardeners Association

Helping Others Help Themselves



THIS ISSUE

Spring is struggling to release our plants from winter, but the amount and variety of bird song in my garden tells me it's really spring non-the-less! I saw my first coltsfoot flower on April 6th. The crocus and snowdrops had been in flower about a month at that point. How can you not marvel at the resilience of a tiny flower that pops up and opens through the snow and then smiles at you after having been buried by a 25cm snowfall since you last saw it? The spring hazel was so ecstatic about an end to the drought that they flowered in December. I was dreaming of Japanese beetle deaths due to the long, cold winter period, but the number of ticks I've already encountered has quashed that fantasy.

We have some great contributions to this issue. I hope you enjoy them! Thank you to everyone who responded to my call for articles. I can't do it without you! Carol



PRESIDENT'S MESSAGE

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Hello Everyone! Here we are in April again. The prospect of seedlings, bulbs and perennials beginning to emerge is a happy one. I have seen many pics of snowdrops on social media. A friend in the UK has pics of his daffodils and snake's head fritillaries on his FB page!

It has been a busy winter for the Association as there have been a number of new projects on the go. You are welcome to participate in these. They include the Question and Answer items (entitled FAQs) which are on the website www.atlanticmastergardeners.ca as well as the work on the Growing Together initiative (which is intended for use by those wanting to work with school classes or youth groups) to teach basic gardening concepts. This is under the title Garden Activities on the website. For the first time this year the AMGA is offering a Bursary to one Field School 2026 participant who is a student AMGA member.

Our membership now is about 100 certified MGs, Graduates, and students. Our first Labrador MG student joined this year. We have members in all Atlantic Provinces plus several in Quebec, and one each in Ontario and New Hampshire.

We are looking forward to the Conference in Truro on May 28 and 29. Sandra and her committee have put together a great group of presenters. On the Thursday, the students in Field School will be joining us. This is a super opportunity to share with them your MG experience and answer their questions.

Also on Thursday night (the 28th) our Banquet and Awards ceremony will honour those having finished their courses and become MGs or certified MGs. This year the Banquet will be on Campus, in Jenkins Hall, so it will be easily accessible to those staying in residence.



Many thanks to the Executive members and those who have taken on leadership in some of the growth and learning opportunities noted above.

There is also some exciting work ahead as we venture beyond the capabilities currently on our website. Interest in the on-line Zoom sessions is a fine way for us to get together. We are looking for other ways to do this so that MGs don't "feel alone".

For anyone in the Fredericton area, the Fredericton Botanic Garden welcomes volunteers year-round. For example, in the next six weeks there are many opportunities to volunteer and learn, as we open our greenhouses and begin the run up to our Annual Plant Sale, May 23 and 24.

I hope to see many of you in Truro, in the meanwhile, Happy Gardening!

Heather

March 15, 2026 *Source:* Johns Hopkins University

Summary:

Scientists studying crops irrigated with treated wastewater discovered that trace pharmaceuticals often collect in plant leaves. Tomatoes, carrots, and lettuce absorbed medications such as antidepressants and seizure drugs during the experiment. However, the edible portions of tomatoes and carrots contained much lower levels than the leaves. The findings help researchers understand how crops process contaminants as wastewater reuse becomes more common.



The study, published in *Environmental Science and Technology*, is part of a broader effort to understand the safety of irrigating crops with municipal

wastewater. In most cases, this water has already been processed through treatment facilities before being reused.

"Farming practices place a high demand on freshwater resources. With limited rainfall and droughts threatening global water supplies, we're looking at a future with shortages that may only be met by repurposing treated wastewater," said Daniella Sanchez, a doctoral student at Johns Hopkins University and lead author on the study. "To continue to use wastewater safely, we need a more sophisticated understanding of where and how crop species metabolize, or break down, agents in the water."

Studying How Crops Absorb Psychiatric Medications

Sanchez examined four psychoactive pharmaceuticals frequently detected in treated wastewater: carbamazepine, lamotrigine, amitriptyline, and fluoxetine. These medications are prescribed to treat conditions such as depression, bipolar disorder, and seizures.

To study how plants interact with these drugs, the researchers grew tomatoes, carrots, and lettuce in a temperature-controlled chamber. The plants were supplied with a nutrient solution made of ultrapure water, salts, nutrients, and one of the medications for as long as 45 days.

Scientists then collected samples from various parts of each plant. Using advanced chemical analysis, they investigated how the medications were taken up by the plants, what byproducts formed as the plants processed them, and where those substances ended up within the plant tissues.

Pharmaceuticals Concentrate in Plant Leaves

The analysis showed that pharmaceuticals and their breakdown products largely accumulated in leaves. Tomato leaves contained more than 200 times the concentration of these compounds compared with the tomato fruits. In carrots, the leaves had roughly seven times the levels found in the edible roots. The researchers stressed that these measurements should not be interpreted as a health warning. Instead, the results provide a clearer picture of how plants distribute chemical compounds that enter through irrigation water.

News - Climate By Douglas Fox
January 8, 2026

Hidden tree bark microbes munch on important climate gases

Trees are known for capturing carbon dioxide as they grow. But they also soak up other gases implicated in climate change through microbes in their bark.



The tree bark microbes feast on hydrogen, methane and carbon monoxide, researchers report January 8 in *Science*. Methane is a greenhouse gas 28 times more potent than carbon dioxide over a 100-year period. Carbon monoxide — which is lethal to humans — and hydrogen enhance global warming indirectly, by helping methane persist longer in the atmosphere. Getting rid of these gases “is a

previously didn't realize was happening," says Luke Jeffrey, a biogeochemist at Southern Cross University in Lismore, Australia.

An estimated 143 million square kilometers of tree bark exist worldwide — roughly equivalent to the combined area of all seven continents — and about six trillion microbes inhabit every square meter of tree bark, Jeffrey and his colleagues estimate.

This newly discovered bark microbiome was "hidden in plain sight," says Jonathan Gewirtzman, a forest ecologist at Yale University, who was not part of the project. It "highlights this as an environment that we know so little about."

These discoveries about the hidden tree bark biome stem from years of research into the sources of methane, which is responsible for about 30 percent of human-caused warming. This gas bubbles up from oxygen-starved microbes living in the waterlogged sediments of lakes and wetlands.

Tree bark is populated with microbes that consume several important climate gases, including methane, hydrogen and carbon monoxide. When scientists measured methane percolating up from the flooded lowlands of the Amazon, the amount coming out was only about half what it should be, based on measurements from space. Then in 2017, another team of scientists realized that only half of region's methane was coming out of the ground. The other half — amounting to 15 or 20 million metric tons per year — was seeping out of Amazonian tree trunks.

People thought the trees were acting as passive chimneys — gushing out soil methane that came in through their roots. But in 2021, Jeffrey and his colleagues discovered a wrinkle.

Working with broad-leaf paper bark trees (*Melaleuca quinquenervia*) in Australia, the team found that the amount of methane coming out of tree bark was about 35 percent less than what enters from below. They concluded that microbes in the bark were eating it — oxidizing it for energy as it seeped out.

“That could be a really huge ecosystem service that these microbes are providing” by removing a major greenhouse gas, says Pok Man Leung, an ecophysiologicalist at Monash University in Clayton, Australia. He and Chris Greening, a microbiologist also at Monash, helped identify the microbes living in the bark of those trees.

In the latest study, Jeffrey, Leung, Greening and colleagues profiled the collective genomes of thousands of microbial species living in paper bark trees and seven other common tree species in Australia. The researchers found that microbes that oxidize hydrogen gas for energy were even more common than the methane-eaters. Microbes that oxidize carbon monoxide were also abundant.

Experiments in live trees showed that bark microbes don't just eat these gases as they diffuse up through the trees; they also suck in methane, hydrogen, and carbon monoxide from the surrounding air. These gases exist in the atmosphere at only trace levels, ranging from 2 parts per million to 40 parts per billion. But multiplied across the entire world, tree microbes are consuming vast amounts of them – an estimated 25 to 50 million tons of methane alone, according to a 2024 study.

By removing these other climate gases, tree bark microbes enhance the already significant benefits trees provide by absorbing CO₂, Leung says.

Forest restoration remains an important strategy for combating climate change, and this new knowledge could make it more effective. The eight tree species examined in this study had differing mixes of microbes in their bark, eating different

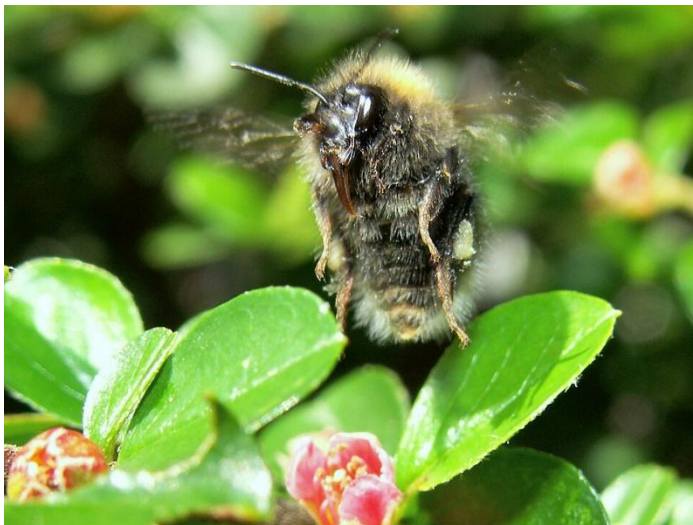
amounts of trace gases. This insight could help scientists select those tree species best suited to blunt climate change.

“You’re not just thinking about the tree you’re planting, but also the microbes within the tree,” Greening says. “You can ideally get rid of three or four climate-active gases for the price of one.”

NEWS - By [Rachel Berkowitz](#), April 9, 2024

Flowering plants may have a secret power for knowing when to lure pollinators.

They could act as antennas for bees’ electrical signals and transmit those signals through the soil, biophysicist Daniel Robert reported March 6 in Minneapolis at the American Physical Society meeting. The finding offers a possible clue to how floral neighbors share information about when to produce nectar, saving energy for when pollination looks promising.



in the study.

If a bee’s flapping wings trigger even a small voltage difference in plants, it could be “an interesting demonstration of communication,” says Víctor Ortega-Jiménez, a biomechanics researcher at the University of Maine in Orono who was not involved

Researchers have long proposed that plants have some form of electrical communication. “This process implies information exchange that’s much faster than chemical communication,” says Robert, of the University of Bristol in England.

But how plants' electrical communication works and whether it links species above and below ground remains a puzzle.

Robert and colleagues had previously found that bumblebees carry a positive electric charge, while flowers carry a negative one. In addition, petunia stems not only become more charged when a bee approaches, but their flowers also increase scent production — hinting that the plant can detect pollinators based on a noncontact electrical signal.

In the new study, ecologist Fraser Woodburn, who works in Robert's lab, designed antennas to give off signals that mimic those produced by a bee's wings flapping in an electric field. The antennas were placed above daffodils that the team cultivated in the laboratory. The team also placed pieces of metal, or electrodes, on flower stems. By measuring the variation in voltage at the stem surface, the researchers could infer if the plants could detect the signal.

Daffodils, the results suggest, could receive electrical signals from the antennas without physically contacting them. Changing the flower's shape by removing its center trumpet or petals reduced its signal-receiving ability, the team reports, perhaps by making it less of a "dish."

Next, the researchers took the work outside, to hogweed plants and buttercups in the University of Bristol gardens. The team again mimicked sending bees' electrical signals above a row of flowers outfitted with electrodes. Nearby flowers in the same soil also donned electrodes, but those plants were covered with a metal shield to block any electrical or chemical signals in the air.

Surprisingly, the electrodes on the shielded plants detected electrical signals, suggesting the plants passed them underground.

Those signals maintained their strength even on plants farther away from the initial beelike signal.

“What is extraordinary about this work is that it suggests that plants perhaps talk to each other through electric fields,” says Scott Waitukaitis, a physicist at the Institute of Science and Technology Austria in Klosterneuburg.

The researchers stop short of saying that plants use these electrical signals, says Waitukaitis, who studies electrical exchanges between objects. “Though far-fetched, this idea is not entirely out of the realm of reason, and more work should certainly be done to explore the possibility.”

Biophysicist and botanist Ingo Dreyer of the University of Talca in Chile is skeptical of the result. Electrically, a flying bee “hardly exchanges charges with its environment,” Dreyer says. What’s more, the input signal in the experiments was 10 volts while the detected signal was less than 20 millivolts — one five-hundredth the strength of the original. That raises questions about transmission.

The weaker, detected signal, Robert says, indicates “a slow conductive process, but nonetheless conductive.” The signal could be transmitted underground to other plants through electrolytes, wet soil or fungus, he says. Still, the general consequences of that conduction are not clear.

The exchange could ultimately help plants conserve energy, Robert says. Making nectar to attract pollinators is expensive. Finding a way to time production to when pollinators are present could pay off.

FIRE-RESILIENT PLANTS: GARDENING SMARTER IN A CHANGING CLIMATE

As wildfire seasons grow longer and more unpredictable, many Atlantic Canadian homeowners are asking an increasingly urgent question: can landscaping reduce wildfire risk? While no plant or garden can stop a wildfire outright, research shows that plant selection, spacing, and maintenance strongly influence how fire behaves around homes—and whether structures ignite at all.

Fire-resilient landscaping does not mean stripping yards bare or replacing gardens with gravel. Instead, it involves understanding how plants burn, how embers travel, and how design choices can either increase or reduce ignition potential near buildings. With the right approach, gardens can remain attractive, functional, and safer without sacrificing ecological value.

What Does “Fire-Resilient” Really Mean? Terms such as fire-resistant, fire-smart, or wildfire tolerant are often used interchangeably, but none mean fire-proof. Fire-resilient plants are simply less likely to ignite quickly, burn intensely, or transmit flames toward a structure. Research indicates that plants with the following characteristics tend to perform better in wildfire-prone environments such as high moisture content in leaves and stems, low resin, oil, and sap levels, open, airy growth habits, minimal retention of dead material and slower growth and reduced woody fuel accumulation.

In contrast, dense conifers such as spruce, fir, pine, cedar, and juniper contain volatile oils and often retain dry needles, making them highly flammable. When planted close to buildings, they can act as ladder fuels, allowing flames to climb into siding, eaves, and roofs. Thick evergreen hedges, unmanaged shrubs, and dry mulches can also trap wind-driven embers, the leading cause of home ignition during wildfires. What Makes a Plant a Safer Choice?

Fire-resilient landscaping focuses on reducing fire intensity and ember ignition, not eliminating vegetation. Many deciduous trees, shrubs, and herbaceous plants perform well in wildfire-exposed areas when properly placed and maintained. These species generally have higher moisture content, lower flammability, and seasonal leaf drop, reducing fuel loads compared to evergreen plants.

Where You Plant Matters:

The First 1.5 Meters

FireSmart principles identify the first 1.5 meters around a structure as the most critical zone for wildfire risk reduction. This area should prioritize non-combustible or low flammability materials. Best practices include gravel, stone, or pavers directly adjacent to buildings, along with low, well-watered perennials or groundcovers. Shrubs, evergreens, wood mulch, and dense plantings should be avoided in this zone, which is especially vulnerable to ember accumulation. Simple design choices here can dramatically reduce ignition risk. Even fire-resilient plants can become hazardous if neglected. Dead leaves, dry branches, and accumulated litter provide fine fuels that ignite easily. Essential maintenance includes seasonal cleanup, pruning to maintain airflow, adequate watering during dry periods, and clearing debris from roofs, gutters, and foundations.

Well-designed fire-resilient landscapes often require less long-term maintenance, as climate-adapted and native species tend to thrive once established.

Beyond Fire:

Additional Benefits Fire-resilient gardens offer benefits beyond wildfire protection. Many recommended species are drought-tolerant, pollinator-friendly, and well suited to Atlantic Canada's changing climate.

Native and deciduous plantings support biodiversity, improve soil health, and reduce the need for chemical inputs, while also providing shade, cooling, and seasonal beauty. Conclusion Gardens designed with wildfire in mind do not eliminate risk, but they change outcomes. Strategic plant choices, thoughtful placement, and consistent maintenance can slow fire spread, reduce ember ignition, and create safer conditions for both homeowners and firefighters.

Ultimately, fire-resilient landscaping is about informed choices and working with nature—creating gardens that are not only beautiful, but resilient in an increasingly fire prone world.

References


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3. CAL FIRE. (n.d.). Home landscaping for fire. California Department of Forestry and Fire Protection. Retrieved January 12, 2026, from <https://www.readyforwildfire.org/prepare-forwildfire/get-ready/defensible-space/>
4. National Fire Protection Association. (n.d.). Firewise USA® landscaping principles. Retrieved January 12, 2026, from <https://www.nfpa.org/education-andresearch/wildfire/firewise-usa>
5. McCurdy, K. et al. (January 2026) Maritime Fire-Resistant Species Guide

Appendix

Appendix A: Maritime Plant Species List For Homeowners to further learn: <https://firesmartcanada.ca/resources-2/>

- FireSmart Guide to Landscaping <https://firesmartcanada.ca/program-support/> - FireSmart101 Training

MARITIME FIRESMART PLANT GUIDE

LEGEND INFORMATION				
PRIORITY ZONES		 <p style="font-size: 8px; margin-top: 5px;">The name and image of Ember are trademarks of ©2018.</p>	SUN USE	
0-1.5M (Immediate)	Perennial/Annual or Ground Cover Only		FS	FULL SUN
1.5-10m (Intermediate)	Leafy trees, grasses and shrubs		PSH	PARTIAL SHADE
10-30M (Extended)	Needled trees		SH	SHADE
WATER USE CATEGORY			LOCAL, VISITOR OR INVASIVE	
LOW	DROUGHT TOLERANT		NON	NON NATIVE
LOW-MEDIUM	WELL DRAINED SOILS		NATIVE	RESIDENT
MEDIUM	DOES NOT LIKE DRY SOIL		INVASIVE	SPREADS
MEDIUM-HIGH	LIKES WET FEET		HYBRID	MIX OF SPECIES
HIGH (S)	LIKES POND LIFE SALT TOLERANT		NA/NON	SPP. SOME NATIVE SOME NOT

PLANTS WITHIN THIS GUIDE ARE MARITIME FRIENDLY

DISCLAIMER: No plants are fire-proof and this guide is meant to be general. Please take into consideration the risk of wildfire for your individual property and follow all FireSmart landscaping best practises. Visit: www.firesmartcanada.ca for more information.

LATIN NAME	COMMON NAME	SUN SHADE	ATTRACTS	HEIGHT	NATIVE NON INV	WATER USE (See Legend) (s) - Salt Tolerant	PLACEMENT WITHIN HOME IGNITION ZONE
SHRUBS							
Abelia mosanensis	Abelia	FS/PSH		0.2-3.5M	NON	LOW-MEDIUM	1.5-10M
Abeliophyllum distichum	White Forsythia	FS		2.5-3m	NON	LOW-MEDIUM	1.5-10M
Actaea rubra	Red Baneberry	FS-PSH	Pollinators	1m	NATIVE	LOW-MEDIUM	1.5-10M
Amelanchier canadensis	Canada Serviceberry	FS-PSH	Birds/Pollinators	8m	NATIVE	MEDIUM	1.5-10M
Amelanchier laevis	Smooth Serviceberry	FS-PSH	BIRDS	12m	NATIVE	MEDIUM	1.5-10M
Arctostaphylos uva-ursi	Common Bearberry	FS		1ft	NATIVE	LOW	1.5-10M

LATIN NAME	COMMON NAME	SUN SHADE	ATTRACTS	HEIGHT	NATIVE NON INV	WATER USE (See Legend) (s) - Salt Tolerant	PLACEMENT WITHIN HOME IGNITION ZONE
VINES							
Apios americana	American Groundnut	FS	Butterfly	3m	NATIVE	MEDIUM	10-30M
Asclepias tuberosa	Butterfly Milkweed	FS	Butterfly	1m	NATIVE	LOW-MEDIUM	10-30M
Celastrus scandens	Climbing Bittersweet	FS		5m	NATIVE	MEDIUM	10-30M
Clematis virginiana	Virginia Clematis	FS-PSH		5m	NATIVE	LOW-MEDIUM	10-30M
GRASSES							
Andropogon, Carex, Polystichum, Panicum, Hybrid Calamagrostis, Elymus	Sedge, Ferns, Switchgrass, Bluestem, Feather Reedgrass, Wild Rye	FS		0.5-1.5m	NA/NON	LOW-MEDIUM	1.5-10M

LATIN NAME	COMMON NAME	SUN SHADE	ATTRACTS	HEIGHT	NATIVE NON INV	WATER USE (See Legend) (s) - Salt Tolerant	PLACEMENT WITHIN HOME IGNITION ZONE
SHRUBS							
<i>Aronia arbutifolia</i>	Red Chokeberry	FS-PSH	Birds/Pollinators	1.8-3M	NATIVE	MEDIUM	1.5-10M
<i>Aronia melanocarpa</i>	Black Chokeberry	FS-PSH	Birds/Pollinators	1.8-3M	NATIVE	MEDIUM	1.5-10M
<i>Berberis thunbergii</i>	Barberry	FS		0.45-1.5M	INV	LOW	1.5-10M
<i>Buddleia x</i>	Butterfly Bush	FS		1-4M	NON	MEDIUM	1.5-10M
<i>Calycanthus floridus</i>	Carolina Allspice/Sweetshrub	FS/PSH		1.8-3.5M	NA	LOW-MEDIUM	1.5-10M
<i>Caragana arborescens</i>	Peashrub	FS/PSH	Pollinators	2-6M	NON	MEDIUM	1.5-10M
<i>Cephalanthus occidentalis</i>	Buttonbush	FS/PSH	Pollinators	1-3M	NATIVE	MEDIUM-HIGH	1.5-10M
<i>Chaenomeles japonica</i>	Flowering Quince	FS-PSH		0.6-3M	NON	MEDIUM	1.5-10M
<i>Clethra alnifolia</i>	Summersweet	FS-PSH	Pollinators	1-3M	NATIVE	LOW-MEDIUM	1.5-10M
<i>Comptonia peregrina</i>	Sweet Fern	FS		0.5-1.5M	NATIVE	LOW	1.5-10M
<i>Cornus alternifolia</i>	Pagoda Dogwood	FS		2.1-3M	NATIVE	MEDIUM	1.5-10M
<i>Cornus sericea</i>	Red Osier Dogwood	FS		2.1-3M	NATIVE	MEDIUM	1.5-10M
<i>Cornus spp.</i>	Dogwoods	FS		2.1-3M	NA/NON	MEDIUM	1.5-10M
<i>Corylus avellana 'contorta'</i>	Corkscrew Hazel	FS		1.2-2.4M	NON	LOW	1.5-10M
<i>Corylus cornuta</i>	Beaked Hazelnut	FS	ALL	1.2-2.4M	NATIVE	LOW	1.5-10M
<i>Cotinus coggygria</i>	Smokebush	FS		3-4.5M	NON	LOW	1.5-10M
<i>Daphne caucasica</i>	Caucasian Daphne	FS-PSH		0.6-1.2M	NON	MEDIUM	1.5-10M
<i>Daphne mezereum</i>	February Daphne	FS-PSH		0.6-1.2M	NON	MEDIUM	1.5-10M
<i>Dasiphora (formerly Potentilla) fruticosa</i>	Shrubby Cinquefoil/Potentilla	FS	Pollinators	0.1-1M	NATIVE	MEDIUM-HIGH	1.5-10M
<i>Deutzia spp.</i>	Deutzia	FS-PSH	Birds	0.5-3M	NON	LOW	1.5-10M
<i>Diervilla lonicera</i>	Bush Honeysuckle	FS-PSH	Birds	0.5-1M	NATIVE	LOW-MEDIUM	1.5-10M
<i>Elaeagnus angustifolia</i>	Russian Olive	FS	Birds	11M	INV	LOW	1.5-10M
<i>Enkianthus campanulatus</i>	Redvein Enkianthus	FS/PSH		2-4M	NON	MEDIUM	1.5-10M
<i>Euonymus alatus</i>	Burning Bush	FS-PSH		1.2-1.8M	INV	HIGH	1.5-10M
<i>Exochordia x macrantha</i>	Pearlbush	FS-PSH			NON	MEDIUM	1.5-10M

LATIN NAME	COMMON NAME	SUN SHADE	ATTRACTS	HEIGHT	NATIVE NON INV	WATER USE (See Legend) (s) - Salt Tolerant	PLACEMENT WITHIN HOME IGNITION ZONE
SHRUBS							
Forsythia spp.	Forsythia	FS		2.5-3M	NON	LOW-MEDIUM	1.5-10M
Fothergilla gardenii	Fothergilla	FS-PSH	Pollinators	1M	NON	LOW	1.5-10M
Halesia carolina	Silverbell	PSH		8M	NA	MEDIUM - HIGH	1.5-10M
Hamamelis spp.	Witch Hazel	FS-PSH		1.8-9M	INV	MEDIUM	1.5-10M
Heptacodium miconiodes	Seven Son Tree	PSH		4-9M	NON	LOW -MEDIUM	1.5-10M
Hibiscus syriacus	Rose of Sharon	FS-PSH	Pollinators	2.5-3.5M	NON	MEDIUM	1.5-10M
Hydrangea spp.	Hydrangea	FS-PSH		1.2-1.8M	NA	MEDIUM	1.5-10M
Hypericum kalmianum	St. John's Wort	FS-PSH		0.25m	NON	MEDIUM	1.5-10M
Ilex verticillata	Winterberry	PSH	Pollinators/Birds	1-5M	NATIVE	MEDIUM-HIGH	1.5-10M
Itea virginica	Sweetspire	FS-PSH	Pollinators	1-3M	NATIVE	MEDIUM-HIGH	1.5-10M
Kerria japonica	Kerria	PSH-FULL		1.5-3M	NON	MEDIUM	1.5-10M
Kolkwitzia amabilis	Beauty Bush	FS-PSH		2.4M	NON	MEDIUM	1.5-10M
Ligustrum spp.	Privet	FS-PSH		1.8-4.5M	INV	MEDIUM	1.5-10M
Lindera benzoin	Spice Bush	PSH-FULL	Pollinators/Birds	2-4M	NATIVE	MEDIUM	1.5-10M
Lonicera tatarica	Honeysuckle (shrub)	PSH	ALL	3M	INV	MEDIUM	1.5-10M
Morella pensylvanica	Northern Bayberry	FS	BIRDS	1-3m	NATIVE	LOW (S)	1.5-10M
Morus alba	Mulberry	PHS	BIRDS	10-20M	NON	MEDIUM	1.5-10M
Myrica gale	Bayberry	FS-PSH		2M	NATIVE	MEDIUM - HIGH	1.5-10M
Nandina domestica	Sacred Bamboo	PSH-FULL		1-3M	NON	MEDIUM	1.5-10M
Philadelphus spp.	Mockorange	FS-PSG	Pollinators	1.8-2.4M	NA/NON	MEDIUM	1.5-10M
Physocarpus opulifolius	Ninebark	FS-PSH	Pollinators	1.5-3M	NATIVE	LOW-MEDIUM	1.5-10M
Prunus cistena	Sandcherry	FS-PSH		2-3M	NON	MEDIUM	1.5-10M
Prunus triloba	Flowering Almond	FS-PSH	Pollinators	2.5-4m	NON	MEDIUM	1.5-10M
Prunus virginiana	Chokecherry	FS-PSH	Pollinators	5.5-7.5M	NATIVE	MEDIUM	1.5-10M
Rhododendron groenlandicum	Labrador Tea	FS	Pollinators	0.2M	NATIVE	MEDIUM-HIGH	1.5-10M
Rhododendron spp.	Rhodora and Azaleas	FS-PSH		1.5M	NA/NON	HIGH	1.5-10M
Ribes alpinum	Flowering Currant	FS-PSH	Pollinators	0.9-1.8M	NON	LOW-MEDIUM	1.5-10M

LATIN NAME	COMMON NAME	SUN SHADE	ATTRACTS	HEIGHT	NATIVE NON INV	WATER USE (See Legend) (s) - Salt Tolerant	PLACEMENT WITHIN HOME IGNITION ZONE
SHRUBS							
Rosa spp.	Rose	FS-PSH	Pollinators	1.5-1.8M	NA/NON	LOW	1.5-10M
Rubus allegheniensis	Allegheny Blackberry	FS	Pollinators	2M	NATIVE	MEDIUM	10-30M
Rubus chamaemorus	Cloudberry	FS	Pollinators	1m	NATIVE	MEDIUM	1.5-30M
Rubus occidentalis	Black Raspberry	FS	Pollinators	2M	NATIVE	MEDIUM	10-30M
Rubus idaeus	Wild red Raspberry	FS	Pollinators	2m	NATIVE	LOW-MEDIUM	10-30M
Salix alba	Flame Willow	FS	Pollinators	1.8-4M	NON	LOW-MEDIUM	1.5-10M
Salix discolor	Pussy Willow	FS	Pollinators	1.8-6M	NATIVE	LOW-MEDIUM	1.5-10M
Salix integra	Dappled Willow	FS-PSH		1.8-6M	NON	LOW-MEDIUM	1.5-10M
Salix purpurea	Arctic Willow	FS-PSH		3-6M	NON	LOW-MEDIUM	1.5-10M
Salix repens	Creeping Willow	FS		1.5M	NON	MEDIUM-HIGH	1.5-10M
Sambucus canadensis	Black Elderberry	FS-PSH	Pollinators	1.5-9M	NATIVE	LOW	1.5-10M
Sambucus nigra	Elderberry	FS	Pollinators	6M	NON	MEDIUM	1.5-10M
Sambucus racemosa	Red Elderberry	FS	Pollinators	2-4M	NATIVE	MEDIUM	1.5-10M
Shepherdia canadensis	Buffaloberry	FS		1.8-3M	NATIVE	LOW	1.5-10M
Sorbaria sorbifolia	False Spirea	FS		1.5-2.5M	NON	LOW-MEDIUM	1.5-10M
Spiraea japonica	Spiraea	FS		1.5-2M	NON	LOW-MEDIUM	1.5-10M
Spiraea nipponica	Snowmound Spirea	FS		1.5-2M	NON	LOW-MEDIUM	1.5-10M
Spiraea tomentosa	Steeplebush	FS	Pollinators	1.5m	NATIVE	MEDIUM	1.5-10M
Spiraea x bumalda	Spiraea	FS		1.5-2M	NON	LOW-MEDIUM	1.5-10M
Spiraea x vanhouttei	Bridalwreath Spirea	FS		1.5-2M	NON	LOW-MEDIUM	1.5-10M
Spirea alba	Meadowsweet	FS	Pollinators/Birds	1-1.5M	NATIVE	HIGH	1.5-10M
Stephanandra incisa	Stephanandra	FS-PSH		0.2-1M	NON	MEDIUM	1.5-10M
Symphoricarpos albus	Snowberry	FS-PSH		1-1.5M	NON	MEDIUM	1.5-10M
Symphoricarpos orbiculatus	Coralberry	FS-PSH		0.2-1.2M	NON	MEDIUM	1.5-10M
Syringa hybrids	Dwarf Lilac	FS		2.5-3.5M	NON	MEDIUM	1.5-10M
Syringa vulgaris	Lilac	FS		4-6M	NON	MEDIUM	1.5-10M



LATIN NAME	COMMON NAME	SUN SHADE	ATTRACTS	HEIGHT	NATIVE NON INV	WATER USE (See Legend) (s) - Salt Tolerant	PLACEMENT WITHIN HOME IGNITION ZONE
SHRUBS							
Vaccinium spp.	High/low Blueberry	FS-PSH	Pollinators/Birds	0.15 - 3.5M	NATIVE	LOW	1.5-10M
Viburnum carlesii	Korean Spice Viburnum	FS-PSH		1-2.5M	NON	MEDIUM	1.5-10M
Viburnum dentatum	Arrowwood Viburnum	FS-PSH		2-3M	NATIVE	MEDIUM	1.5-10M
Viburnum lantana	Wayfaring Tree	FS-PSH		1-2.5M	NON	MEDIUM	1.5-10M
Viburnum lentago	Nannyberry Viburnum	FS-PSH	Pollinators/Birds	3.5-6M	NATIVE	MEDIUM	1.5-10M
Viburnum nudum var. cassinoide	Wild Raisin/Witherod Viburnum	FS-PSH	Pollinators/Birds	4M	NATIVE	MEDIUM	1.5-10M
Viburnum opulus	Snowball Viburnum	FS-PSH		1-2.5M	NON	MEDIUM	1.5-10M
Viburnum opulus var. Americanu	Highbush Cranberry	FS	Pollinators/Birds	1.8-2.5M	NATIVE	MEDIUM	1.5-10M
Viburnum plicatum tomentosum	Doublefile Viburnum	FS-PSH		1-2.5M	NON	MEDIUM	1.5-10M
Viburnum x bodnantense	Pink Dawn Viburnum	FS-PSH		1.5-3M	HYBRID	MEDIUM	1.5-10M
Viburnum x burkwoodii	Burkwoodii Viburnum	FS-PSH		1.5-3M	HYBRID	MEDIUM	1.5-10M
Viburnum x carlcephalum	Fragrant Snowball Viburnum	FS-PSH		1.5-3M	HYBRID	MEDIUM	1.5-10M
Weigela florida	Weigela	FS-PSH	Hummingbirds	1-2.5M	NON	LOW	1.5-10M
X Calycanthus	Sweetshrub hybrids	FS-PSH		1.5-3M	HYBRID	MEDIUM	1.5-10M
TREES							
Acer Palmatum	Japanese Maple	PSH	Pollinators	4.5-7.5m	NON	HIGH	10-30M
Acer rubrum	Red Maple	FS	Pollinators	15-20m	NATIVE	MEDIUM	10-30M
Acer saccharum	Sugar Maple	FS	Pollinators	25-35m	NATIVE	MEDIUM	10-30M
Alnus incana	Speckled Alder	FS		8M	NATIVE	MEDIUM	10-30M
Betula alleghaniensis	Yellow birch	FS		18-24m	NATIVE	MEDIUM	10-30M
Betula papyrifera	White birch	FS		20-40m	NATIVE	MEDIUM	10-30M
Betula populifolia	Gray Birch	FS		6-9m	NATIVE	MEDIUM	10-30M
Catalpa speciosa	Catalpa	FS		12-15m	NON	MEDIUM	10-30M
Fagus grandifolia	American Beech	FS		15-18m	NATIVE	HIGH	10-30M
Fraxinus nigra	Black Ash	FS		12-18m	NON	MEDIUM	10-30M
Fraxinus americana	White Ash	FS		12-18m	NATIVE	MEDIUM	10-30M

LATIN NAME	COMMON NAME	SUN SHADE	ATTRACTS	HEIGHT	NATIVE NON INV	WATER USE (See Legend) (s) - Salt Tolerant	PLACEMENT WITHIN HOME IGNITION ZONE
TREES							
Ginkgo biloba	Ginkgo	FS		15-25m	NON	MEDIUM	10-30M
Gymnocladus dioicus	Kentucky Coffee Tree	FS		12-15m	NON	MEDIUM	10-30M
Juglans cinerea	Butternut	FS		12-18m	NON	MEDIUM	10-30M
Laburnum watereri	Golden Chain Tree	FS-PSH		3.5-4.5m	NON	MEDIUM	10-30M
Liriodendron tulipifera	Tulip Tree	FS	Pollinators	21-27m	NON	HIGH	10-30M
Malus spp.	Crab Apple	FS	Pollinators	4.5-6m	NATIVE	LOW-MEDIUM	10-30M
Ostrya virginiana	Hop Hornbeam	FS-PSH	Birds	15m	NATIVE	LOW	10-30M
Populus tremuloides	Trembling Aspen	FS-PSH	Pollinators	9-12m	NATIVE	MEDIUM HIGH	10-30M
Prunus serotina	Black Cherry	FS	Pollinators/Birds	20m	NATIVE	MEDIUM	10-30M
Quercu rubra	Red Oak	FS		18-23m	NATIVE	MEDIUM	10-30M
Quercus macrocarpa	Bur Oak	FS		21-24m	NON	MEDIUM	10-30M
Rhus typhina	Staghorn Sumac	FS-PSH		4.5-7.5m	NATIVE	MEDIUM	10-30M
Salix babylonica	Weeping Willow	FS	Pollinators	20-25m	NATIVE	HIGH	30M
Sorbus americana	Mountain Ash	FS-PSH	Pollinators	10m	NATIVE	MEDIUM	10-30M
Tilia americana	Basswood	FS-PSH	Pollinators	20m	NATIVE	MEDIUM	10-30M
Tilia spp.	Linden	FS	Pollinators	18-20m	NON	MEDIUM	10-30M
FLOWERS							
Achillea millifolium	Yarrow	FS	Pollinators	0.3-1m	NATIVE	LOW	0-1.5m
Anaphalis margaritacea	Pearly Everlasting	FS	Butterfly	1ft	NATIVE	LOW	0-1.5M
Asclepias incarnata	Swamp Milkweed	FS	Pollinators	1.5m	NATIVE	MEDIUM-HIGH	10-30M
Aquilegia spp.	Columbine	FS-PSH	Birds	1.5ft	NATIVE	LOW	0-1.5M
Eutrochium maculatum	Spotted Joe Pye Weed	FS	Pollinators	1.8m	NATIVE	MEDIUM-HIGH	0-1.5M
Geranium spp.	Geranium	FS		1ft	NATIVE	MEDIUM	0-1.5M
Lobelia spp.	Lobelia	FS	Birds	1.5m	NA/NON	MEDIUM	0-1.5M
Maianthemum spp.	Solomons Seal	PSH		2ft	NA/NON	MEDIUM	0-1.5M
Penstemon spp.	(Foxglove) Penstemon	FS-PSH	Birds	1.2m	NON	MEDIUM	0-1.5M

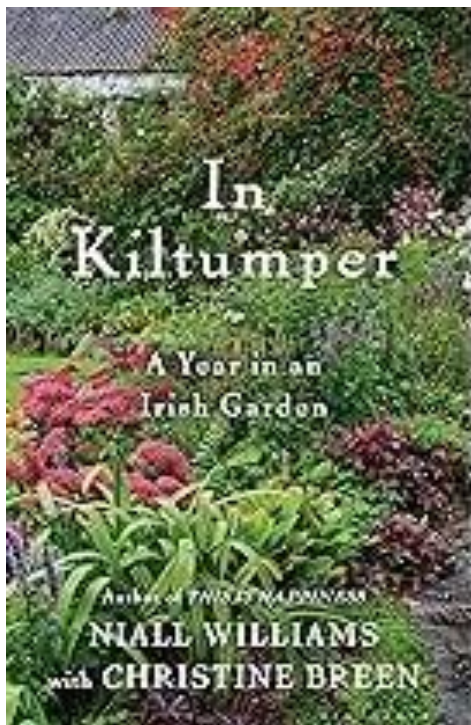
LATIN NAME	COMMON NAME	SUN SHADE	ATTRACTS	HEIGHT	NATIVE NON INV	WATER USE (See Legend) (s) - Salt Tolerant	PLACEMENT WITHIN HOME IGNITION ZONE
FLOWERS							
Rudbeckia spp.	Black Eyed Susan	FS	Pollinators	2.2m	NA/NON	LOW-MEDIUM	0-1.5M
Symphiotrichum spp.	Aster	FS	Butterfly	1m	NA/NON	MEDIUM	0-1.5m
Verbena spp.	Verbena (hastata native)	FS	Pollinators	1.8m	NON	HIGH	0-1.5M
PERENNIALS IN GENERAL	Are fire resistant depending on watering but pose little to no threat to structures						0-1.5m
ANNUALS IN GENERAL	Are fire resistant depending on watering but pose little to no threat to structures						0-1.5m
GROUND COVER							
Ajuga reptans	Ajuga	SH/PSH		0.2ft	NATIVE	MEDIUM	0-1.5M
Anemonastrum canadense	Canada Anemone	PSH		1.5ft	NATIVE	MEDIUM	0-1.5M
Arctostaphylos uva-ursi	Bearberry	FS-PSH		0.2ft	NATIVE	LOW	0-1.5M
Asarum canadense	Canada Wild Ginger	FS-PSH		0.5ft	NATIVE	MEDIUM-HIGH	0-1.5M
Berberidaceae	Epimedium	SH/PSH		0.2ft	NATIVE	LOW	0-1.5M
Calluna Vulgaris	Heath/Heather	FS-PSH		0.2ft	NATIVE	LOW	1.5-10M
Eurybia macrophylla	Large Leaved Aster	PSH		1ft	NATIVE	LOW	0-1.5M
Fragaria virginiana	Virginia Strawberry	FS-PSH		0.5ft	NATIVE	LOW-MEDIUM	0-1.5M
Gaultheria procumbens	Eastern Teaberry	PSH		0.5ft	NATIVE	MEDIUM	0-1.5M
Halerpestes cymbalaria	Seaside Buttercup	FS	Pollinators	0.5FT	NATIVE	HIGH (S)	1.5-10M
Matteuccia struthiopteris	Ostrich Ferns	PSH		1.5m	NATIVE	MEDIUM	0-1.5M
Pachysandra	Pachysandra	SH/PSH		0.2ft	NATIVE	LOW-MEDIUM	0-1.5M
Phlox stolonifera	Creeping Phlox	FS-PSH		0.2ft	NATIVE	LOW-MEDIUM	0-1.5M
Rhodiola rosea	Roseroot	FS		0.5ft	NATIVE	LOW (S)	0-1.5M
Sedum & Hylotelephium	Creeping Sedums	FS-PSH		0.2ft	NATIVE	LOW	0-1.5M
Tiarella cordifolia	Heart Leaved Foamflower	FS		1ft	NATIVE	MEDIUM	0-1.5M
Thymus	Creeping Thyme	FS		0.2ft	NATIVE	LOW	0-1.5M
Viola palustris	Yellow Marsh Marigold	PSH		1.5ft	NATIVE	HIGH	0-1.5M
Viola pubescens	Downy Yellow Violet	PSH	Butterfly	1FT	NATIVE	MEDIUM	0-1.5M
Zizia aurea	Golden Alexanders	FS-PSH	Butterfly	1m	NATIVE	LOW	0-1.5M

Note:

In addition to careful plant placement, roof sprinklers can be placed for the summer to protect your house and adjacent garden area by keeping it wet when fire threatens. I have installed these on my home for less than \$800. Carol



BOOK REVIEWS



Niall Williams and Christine Breen. *In Kiltumper: A Year in an Irish Garden.*

Bloomsbury, 2021. \$24 paperback, 304 pages.

If it's a break you need from the tyranny of gardening books on do this and don't do that, with instructions and cautions that absolutely befuddle you, *Kiltumper* provides a welcome respite and the promise of great writing and meaningful reflection on everyday life. In this book, recommended to me by a nongardening friend in Vancouver, husband and wife Niall Williams and Christine Breen have created a poetic memoir of forty years living in an Irish garden. Given the fluidity of the book, it's no surprise to me that Breen and Williams have written often together (4 co-written memoirs)

as they carefully tend a piece of lumpy ground in County Clare in the west of Ireland, raising two children, cultivating tons of food and flowers, and in short, creating a life full of writing and gardening on Christine's ancestral homestead. She's from New York City and he's from Dublin—they set their roots in Clare in their twenties, and the rest is history.

The book provides a respite for them too: they've been through her cancer, the leaving of their children for New York City, and the imminent threat of a turbine installation about 500 meters from their property. Thankfully, Williams and Breen do not rant about the turbines. Instead, they talk about the complexity of wanting green energy, knowing it is helpful, and yet lamenting the 200-year-old trees and stone walls that came down in the green construction. Gone are the trees they noticed every day, the stone walls that guided their daily stroll, and the peace they had to hear the birds, the neighbours chatting, and the stillness of morning. They are sad beyond measure—already missing their way of life and desperately wanting to record their way of making a life and a living. So, they decided to write this book.

It isn't easy making a living in rural Ireland, yet they find a way to do it and become mostly self-sufficient. Book contracts and advances mean house repairs are possible and so are car repairs. Niall does much of the writing and Christine contributes with botanical drawings and a detailed map of their property, complete with brambles, bridges, greenhouse, beech hedge, and potager. If you can imagine it, they have created it on this stony piece of ground. Yet, they see their property as "landmarked and spirit marked" by their day to day living, and they go to great pains to share this sentiment with the reader.



The flowers, the vegetables and the birds are the stuff of their daily lives and it seems that of the two, Breen is the one drawn to cultivation, tending the rows from morning to night, cutting back and weeding as she must. There is the constant challenge of staking and dealing with drought, and yet she thrives as a gardener. Though not a show garden, Kiltumper is full of paths

through the beds and trees, stands of beeches and old world perennials like peonies and roses, not to mention lupins and poppies and delphiniums. Often, Neill can't recall the names of the plants, but Christine sure can. She helps him notice what is happening day by day in their home and garden, and he records it.

If you're wanting a rest for your soul and have a thirst for poetic, dare I say lyrical, verse, here's the book for you. You won't learn gardening from A to Z, but you will learn to love the garden, to connect with nature and how to live in a time that is deeply troubled. I can't say enough good about it. I found it in the library, and I know it is available online. Check it out.

Gardening in Dry/Drought Conditions

Book reviews by Kristine Swaren

I'm writing this in Antigonish on November 11th. It's been raining for at least two weeks, but I'm reading about gardening in the drought conditions being brought on by climate change. From the SamePage website catalog (which covers all libraries in Nova Scotia except Halifax), I borrowed most of the gardening books which had words in their titles like water-saving, dry, or resilient. From the online descriptions, I didn't bother with some that seemed that they wouldn't include typical growing conditions that Atlantic-province gardeners would encounter. Or the atypical conditions that we experienced this summer – months of drought followed by weeks of rain.

What I learned, both reminders and new, was a combination of principles, practices, projects and plants.

Principles for growing in dry conditions

Know your site: test your soil, sketch the sun and shade patterns, trace water behaviour once it's on/in the ground, check for air circulation above, below and between plant locations. Understand your local climate and precipitation patterns (or lately the lack of pattern?), be aware of the larger environment and ecosystems that you are part of. Plan your garden or your transition to drier conditions with those elements in mind. *The Water-Saving Garden* offers the delightful concept of imagining your property as a pond, with your house as the centre; dropping a pebble in the pond causes ripples outward – each ripple should correspond to progressively more resilient plants that require less attention (and water) the farther away they are. This echoes the permaculture design principle of thinking in zones – the most frequent activities are set up to happen closest to the house; those occurring sporadically are farthest away.

Select plants, hardscaping, and tools that work with your conditions rather than pushing the envelope with every choice.

Practices for optimizing water use

Resilient Garden uses the term Sustainable Drainage Strategies (SuDS) to incorporate practices that affect the flow of water on our properties:

- a permeable driveway that allows rainfall to absorb into the ground rather than heading to the storm drain
- swales, berms, terraces, micro basins, rain gardens, check dams and gabion walls* to direct and/or slow the flow of water once it hits the ground

All the books included practices (less ambitious than those above) that can be incorporated into existing or transitioning gardens:

- design garden beds to group plants by their water needs
- use a soil moisture gauge to check the root zone and determine when you actually need to water
- use drip irrigation on a timer to drastically reduce your water usage
- water less frequently to train roots to grow deep
- amend the soil with compost to improve texture and water retention
- avoid soil compaction, which makes it difficult for water to soak into the root zone
- provide shade or windbreaks to help keep soil moist (according to light requirements)
- mulch to minimize evaporation from the soil, preferably with a light-coloured material to reduce soil heating
- harvest rainwater with rain barrels or ponds
- use dead wood in the bottom of raised beds to hold moisture
- water in the early morning to avoid evaporation loss

Projects to focus watering

The Regenerative Garden advises “Live within your local water budget – don’t use more than your rainfall. Meet all garden needs with captured, cached, or recycled water.” The projects are designed with those aims in mind, with details for: making a rain barrel; hanging a series of planted gutters on a building with each one slightly slanted into the next one down; burying an olla; making a rain gauge; building a rain garden, a wicking raised bed, a self-watering planter or a watering tube.



Make an Olla

This water catchment system may have originated more than 4000 years ago, in Northern Africa and China. With a combination of old and new materials, each olla consists of two unglazed terracotta pots. The drainage hole on the bottom one is plugged, and a second pot is glued on with silicone caulk, tops together. This is buried in the soil beside a plant, with only an inch or two above-ground. The open drainage hole is used to fill both pots, and the water will seep out slowly. Place a glazed saucer upside-down over the drainage hole to limit evaporation

and prevent mosquitoes from breeding.

Plant Selection for Dry Conditions

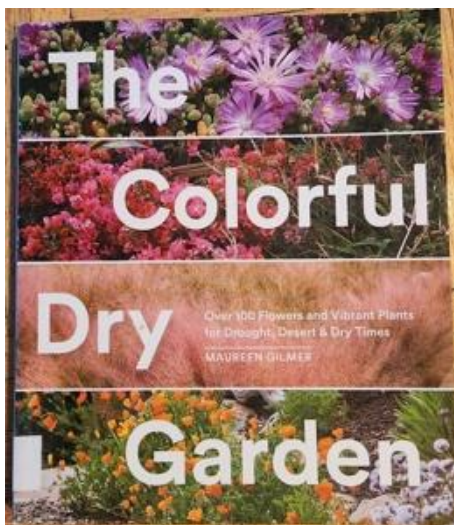
Each of the books has a section of plants that tolerate or prefer dry locations. Plant choices can be very personal, so rather than listing specific plants, here are some planting recommendations for our climate.

- learn the preferred conditions for each plant – what is the environment where it is native: soil, slope, temperatures day and night, precipitation, sun or shade
- space new plants far enough apart that their roots don't have to compete for water (then mulch between)
- whenever possible, plant in fall when soil is still warm and there is more rain and less intense sunlight – this allows good root development before the plants are exposed to summer drought conditions. This is especially helpful for trees and shrubs with dormant tops.

- for summer planting, water well and provide the new plants with filtered shade for their first week
- containers – use large ones to allow root growth, moisture retention and insulation
- plants with large, lush leaves are generally thirsty ones
- in a cold-winter climate, enjoy succulents as annuals
- use plants that make you think “flow” – feathery grasses, fountain shapes, cascading forms, blue/silver ground covers
- know your plants – what do they look like normally? What are signs of stress?

My apologies to those not part of the Nova Scotia library system, but I'm sure you can find these or similar titles where you are. I'm still waiting on a few other books that I reserved, so some of you must have them out! We're all looking for ideas to make our gardens more resilient. Gardens here in Antigonish were subject to mandatory water restrictions this summer, so many gardeners were making trips to favorite plants with buckets of warm-up shower water, or grey water free of food or contaminants; my neighbour hooked up a sump pump to catch laundry water for the garden.

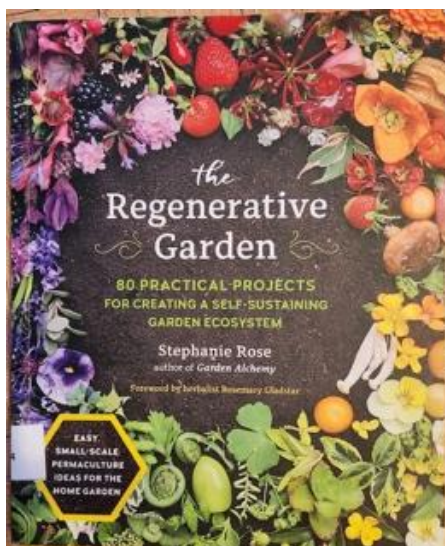
What helpful strategies did you use to conserve or redirect water?



The Colorful Dry Garden – Over 100 Flowers and Vibrant Plants for Drought, Desert and Dry Times

Maureen Gilmer, Sasquatch Books, 2018.
(California)

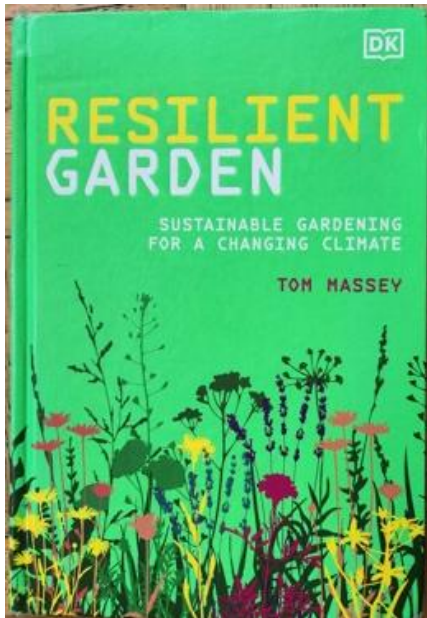
This turned out to be the least useful of the books I borrowed. It began by reinforcing basic garden design ideas and plant selection criteria. For AMGA growers, two pertinent points: one is that drought-resistant plants are often not cold-hardy; the second is Gilmer's repeated caution that you can't drop a desert/dryland plant into an existing garden without adjusting your irrigation practices, so the dryland planting should be a section of plants with similar water needs. Her plant recommendations are focussed on west-coast US zones 7-10, with only a few plants appropriate for US zones 5-6.



Regenerative Garden – 80 Practical Projects for Creating a Self-sustaining Garden Ecosystem
Stephanie Rose, Cool Springs Press, 2022.
(Vancouver)

Rose's 80 projects are grouped into categories: soil improvement, water efficiency (listed above as Projects), plant guilds (another permaculture principle), climate harmony, ethics of reducing waste and encouraging diversity, and community (as well as community gardens, imagine a Little Free Library on your front lawn for sharing seeds

or flowers or plants).



Resilient Garden – Sustainable Gardening for a Changing Climate

Tom Massey, DK Publishing, 2023. (UK)

Massey is a garden designer in the UK, and this book profiles several gardens throughout Europe, with his analysis of what characteristics make them resilient. I found it a fascinating read. One chapter redesigns a typical urban site, both front and back gardens, to show the application of various practices. Another describes the life cycle of sustainable materials for hardscaping.



The Water-Saving Garden – How to Grow a Gorgeous Garden with a Lot Less Water

Pam Penick, Ten Speed Press, 2016. (Texas)

After finding not much useful from an author based in California, I wasn't expecting much from this one in Texas but the content was thorough. Her plant suggestions (only 23 pages out of the 233-page book) are again for much warmer zones, but the majority of the book covers principles and practices that can be used anywhere - from design ideas such as swales and berms, to plant placement, to

tools like soil moisture gauges and drip irrigation. *This is the book that explains two water-slowing structures that were new to me: check dams (on a gentle slope, stack stones and backfill with soil, like a mini version of a retaining wall) and gabion walls (long low wire cages filled with rocks use to create planting terraces).

Just a reminder.....

Garden Phenology

When...	Plant...	in Antigonish...
Crocus bloom	Spinach	Early April
Forsythia blooms (or you hear spring peepers)	Peas	Early-Mid May
Daffodils bloom	Chard, Lettuce, Beets	Mid May
Dandelions bloom	Potatoes	Mid May
Lily-of-the-Valley blooms (or ladybugs emerge from hibernation)	(Transplant) Tomatoes	Early June
Apples bloom	Beans, Corn	Early June
Iris blooms	(Transplant) Peppers	Mid June
Lilac fades	Squash, Cucumber	Mid June
Peonies bloom	Melons	Mid June

GRAPE PHYLLOXERA

Have your grape vines stopped producing healthy fruit and vigorous vines? Do you have weird little nodules/swellings on the roots or leaves? Declining fruit set and vine



health can be caused by factors such as shallow rooting, drought, viruses, fungus, certain types of nematodes, or even animal damage. One of the other causes could be Grape Phylloxera.

What it is:

Grape phylloxera (*Daktulosphaira vitifoliae* or *Viteus vitifoliae*), pronounced "fuh-LAAK-sr-uh", is an aphid-like insect that affects table and wine grapes. It is an aggressive feeder that attacks the roots (and sometimes the leaves) of grape vines. The insect is so small you generally don't see it, but you will see the result of the infestation via galls on roots (and sometimes the leaves), or poor viability of the plants. These gall formations slowly reduce the ability of a vine to successfully grow and bear fruit.

Grape phylloxera can only survive and reproduce on species of *Vitis*, the genus that encompasses all grapes.

Where does it come from:

Phylloxera is native to eastern North America and was first identified on grape roots in California in the 1850s. Shortly after, it was introduced to France on American *Vitis* species vines. It had been imported for use in grapevine breeding programs due to their resistance to powdery mildew. By 1900, two-thirds of all *Vitis vinifera* vineyards in Europe had been decimated.

Currently, it has spread to most grape-growing areas of the world, including New Zealand, Australia, South Africa, South America, Canada, and the United States.

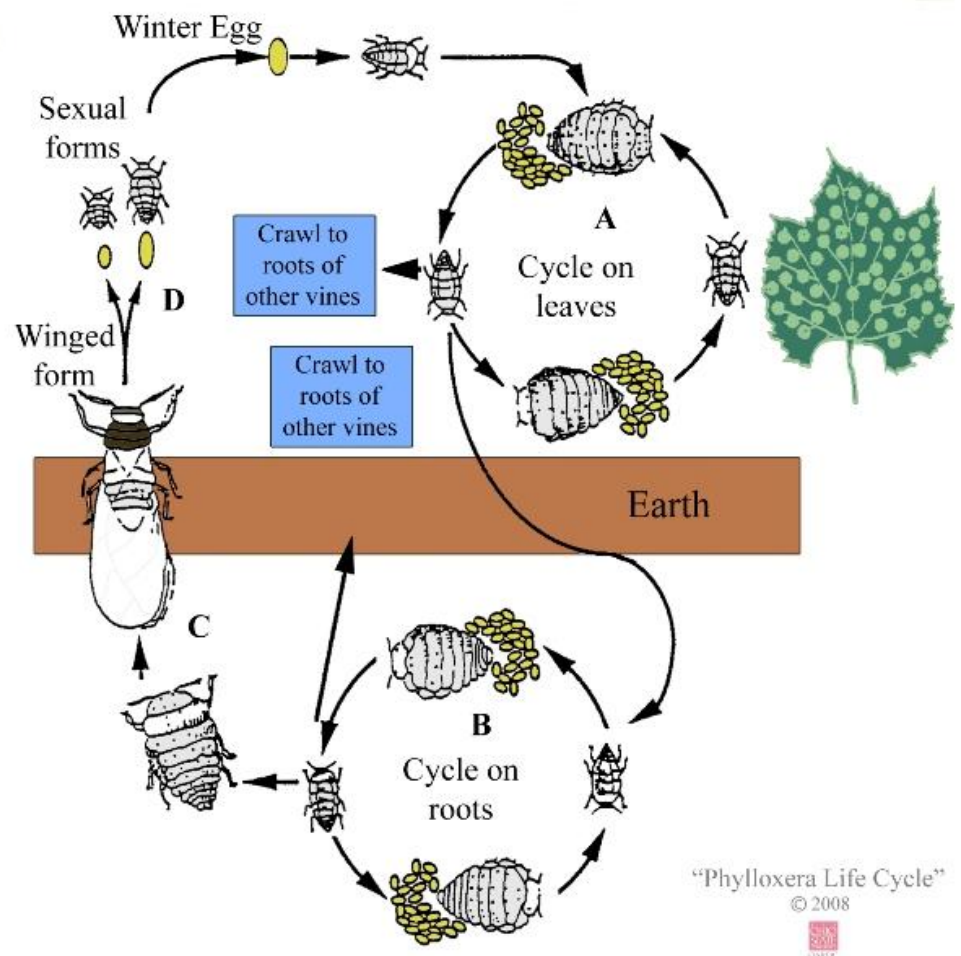
Canadian regulations:

This pest is regulated in Canada by the Canadian Food Inspection Agency (CFIA). New detections should be reported to CIFA to limit its spread and prevent introduction into new areas currently free of the pest. The only effective solution for European stock has been to graft European wine grapes (*Vitis vinifera*) onto resistant American rootstocks. Phylloxera co-evolved with North American vines such as *V. riparia*, *V. rupestris*, *V. berlandieri* and *V. cinerea*.

These North American *Vitis* species have evolved natural defenses, making them generally resistant to phylloxera damage. In turn, this makes them good sources for root stock and hybrid production.

Growth Cycle:

The growth cycle of phylloxera is complex. In susceptible American *Vitis* species (not *Vitis vinifera*), the full life cycle of phylloxera involves migration from the roots to the leaves and then back to the roots. The life cycle includes both sexual and parthenogenetic (without mating) reproduction. In this life cycle, phylloxera can take up to four forms over their lifetimes.



In the *Vitis vinifera* species, phylloxera normally infests only the underground parts of the plant and undergoes an incomplete cycle of seasonal development (the leaf-feeding, gall-producing form is not present).

Identifying the Infestation:



Phylloxera are extremely difficult to see without a hand lens or microscope due to their size (0.7-1mm long, 0.4-0.6mm wide). It's recommended to look for the symptoms that are the result of feeding, instead of looking for the insects themselves. Infestation and damage are more likely to occur in heavy and fine-texture soils (i.e. clay). Compromised vines will live longer in fertile, deep, well-drained soils than in shallow soils, or soils with poor drainage and poor nutrient values. Heavier soils contract and crack when drying, and it is these openings that provide an opportunity for the insect to crawl

in and infest new root systems.

Most nymphs crawl, but some will develop wings in adulthood and are capable of flight to a new area. Above-ground symptoms appear as declining shoot growth, chlorotic leaves, reduced fruit set, increasing patches of stunted, poor vine vigor, or galls on leaves. In a vineyard, it slowly expands outwards in an oval or round shape. You won't see this in a home garden unless you have a large grouping of vines.

Below-ground symptoms occur at the roots in the form of tuberosities or nodosities. The resulting formations are yellowish-brown, hook-shaped swellings, known as galls. When insects feed on the larger roots, it causes rounded swellings and a warty look. In the smaller roots, you see swollen rootlets. If these galls decay, it further weakens the vine. While phylloxera feeds on roots, the eventual death of the vine is usually caused by secondary fungal or bacterial infections. Severity of symptoms can be affected by the variety, age, site location, cultivar differences, pruning and/ or cultural practices. This variety of issues will also affect how fast infestation occurs. It's possible that more than one area can be affected at the same time.

It is believed that phylloxera inject toxic saliva or gut contents into the root during feeding, potentially inducing gall formation. Alternatively, the feeding process may stimulate the plant to release hormones, such as auxin, that may allow the gall to form. Galls may engulf the insect's body. Cooler climates like British Columbia are likely to have two, perhaps three generations of phylloxera per season. In warm areas such as California, there can be four or five generations per season.

Vines are not necessarily affected immediately after infestation. Remarkably, it can take 2 to 15 years from the time of initial infestation for symptoms to appear at a detectable level.

Prevention/Treatment:

Phylloxera is spread from garden to garden (or vineyard to vineyard) on soil or root pieces carried by any form of traffic (i.e. boots, tools, vehicle tires, animals, or picking bins at wineries). Prevention in a home garden involves thorough cleaning of all equipment (i.e. tools, boots etc.). Plants/roots should not be shared with neighbours, and any removed stock should be placed in the garbage, not in the compost. This is also true for a vineyard but is made more formidable due to the scale of operation. The fruit is still edible until the vine stops producing. There is no human harm from this insect as it does not interfere with the actual fruit.

Replanting your vines (or the vineyard) with vines grafted to a resistant rootstock is the only way to manage an infestation over the long term. It is recommended to wait 5 years before replanting vines with new rootstock that are resistant to phylloxera. When planting new vines, ensure the stock isn't infected prior to planting as phylloxera can live on resistant rootstocks. Although the resistant rootstock tolerates phylloxera infestations without dying, it can support populations of phylloxera and serve as a source of new infestations.

Conclusions:

Unfortunately, there is no way to eradicate phylloxera from an infested vineyard. Over time, vines will succumb and die off. Thankfully, phylloxera itself does not spread quickly or effectively on its own. It is through human dispersal that grape phylloxera has been and is currently still introduced to new areas, and how it has become a global pest of concern. Good biosecurity habits prevent spreading.

RESOURCES Articles:

<https://extension.oregonstate.edu/sites/extd8/files/documents/ec1463.pdf>

<https://inspection.canada.ca/en/plant-health/invasive-species/insects/grape-phylloxera>

https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-andseafood/animal-and-crops/plant-health/phylloxera_factsheet.pdf

Pictures: Leaf Galls, Root Galls, Stunted Growth of Vines:

<https://inspection.canada.ca/en/plant-health/invasive-species/insects/grape-phylloxera>

Phylloxera Life Cycle:

<https://ohiograpeweb.cfaes.ohiostate.edu/sites/grapeweb/files/imce/Nitika/Phylloxera%20life%20cycle.jpg>

Closing Words

Last evening while attending an AMGA Executive meeting, I couldn't help but feel reassured by the discussion around how to make members feel the Association has their best interests at heart. How to best make everyone feel welcome? How to create community for a group of people scattered across their region and province? How to make sure new ideas around software and technology serve us well into the future and not just for the short haul? We are in such good hands as a group. I hope you feel the same way I do and can find some small way, that in your own time, you can offer up to help too. That's the interesting thing about community. Stepping forward to take part allows others to welcome you with open arms.



It is a joy to be back in the garden. The peace and sanity of the place is so needed as a series of bulls in china shops careen around the globe. It's nice to know that all that I need to do is make my own small piece of the world a better place. Human. Kind.

Be both. I am grateful to be part of a large circle who find this easy and natural. Enjoy the beauty of the spring, the smell of the earth and the sounds of the natural world.

I am looking forward to getting together in May in Truro! I hope to see you there.

Carol