

# Landscape & Irrigation Guide to Water Efficiency



An introduction to waterwise gardening and landscape design including:

- ✓ Smart design
- ✓ Smart planting
- ✓ Smart irrigation
- ✓ Smart maintenance



# INTRODUCTION

## to water wise gardening

### Why Create a Waterwise Landscape?

- **Often, the design and operation of our landscapes is not well-planned, which can lead to wasteful water use.**
- **Planning, preparing and maintaining your landscape properly will result in a healthier use of water, with better performance, less pests and disease, and hardier plants overall.**
- **Using less water saves money.**
- **Higher water consumption increases the demand for costly infrastructure. Water savings allow the deferral of infrastructure investments.**
- **Better landscaping techniques can reduce fertilizer and pesticide use and the need for maintenance.**
- **Reduced water use leaves more water in lakes, aquifers and streams and supports the ecosystems.**

Our landscapes are a reflection of who we are.

They can add great value to our properties and be a place for relaxation and pride for the whole family.

For decades we have been conditioned to look after our landscapes with excessive use of fertilizers, pesticides and water in order to receive maximum results. However, by planning your landscapes properly, you can reduce or eliminate the need for these while maintaining a healthy landscape.

This guide will help you plan, prepare, plant and maintain your landscape in a manner that will reduce the need for fertilizers, pesticides and excess watering. These measures also reduce the amount of maintenance needed, giving you more time to relax and enjoy your landscape.

### Our Environment

Like many locations of similar latitude, Abbotsford and Mission have four distinct seasons. However, our proximity to the Pacific Ocean provides milder winters, along with much greater winter rainfall than inland areas of the country. Summer on the west coast is known for its relative dryness. It is not uncommon to receive little or no rainfall for weeks at a time. August averages only 20% of November's rainfall.

### Protecting the Resource

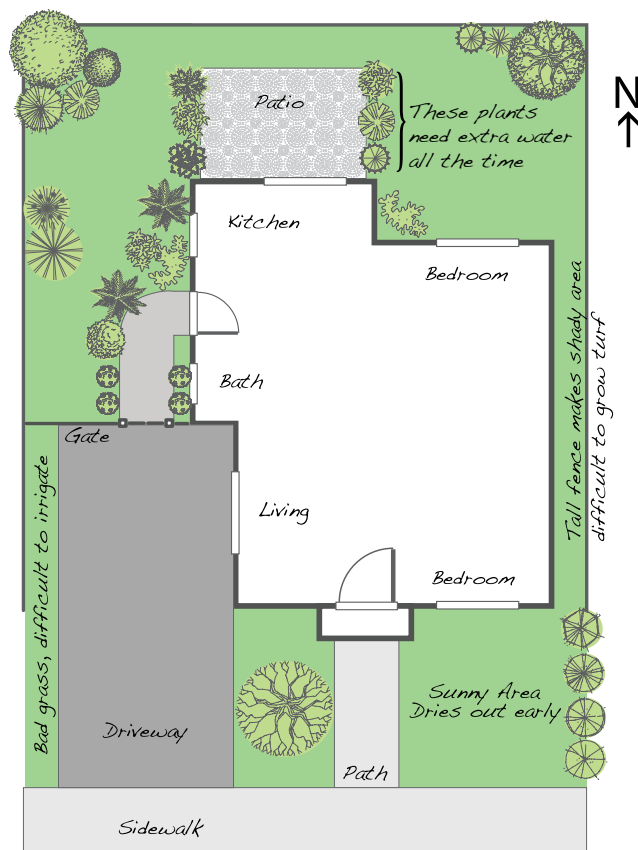
Like most municipalities, Abbotsford and Mission have water restrictions that come in to effect from May through September. This ensures that the community has enough water in the reservoirs for emergency situations and that all residents have access to adequate amounts of clean water for drinking and daily activities through the summer months when water usage is known to be higher.

Water restrictions are set in escalating stages to reflect the level of Dickson Lake, the main source of drinking water for Abbotsford and Mission. When the lake level begins to fall, water restriction stages go higher to limit the amount of water used in lawn sprinkling and for other outdoor uses.

## PLANNING

As you start any project, you should look at what you already have. You need to determine the existing conditions for the right lay-out and the most appropriate selection of plants. By taking an inventory of what conditions currently exist in your garden, you can determine the right selection, placement and maintenance of your various plants.

The best way to do this is by drawing a simple inventory sketch of your landscape.



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You need to determine the existing conditions for the right lay-out and the most appropriate selection of plants.

# How much sun do you have?

Plants have adapted to a variety of conditions in nature, including the level of sunlight they require each day. Below is a guideline to assist you in determining your sunlight.

**Sun:** 6 hours or more of direct sunlight.

**Partial Sun / Partial Shade:** 3 - 6 hours of sun each day.

**Full Shade:** 0 - 3 hours of direct sunlight each day, with some filtered sun through the day.

**Deep Shade:** no direct sunlight at any time.

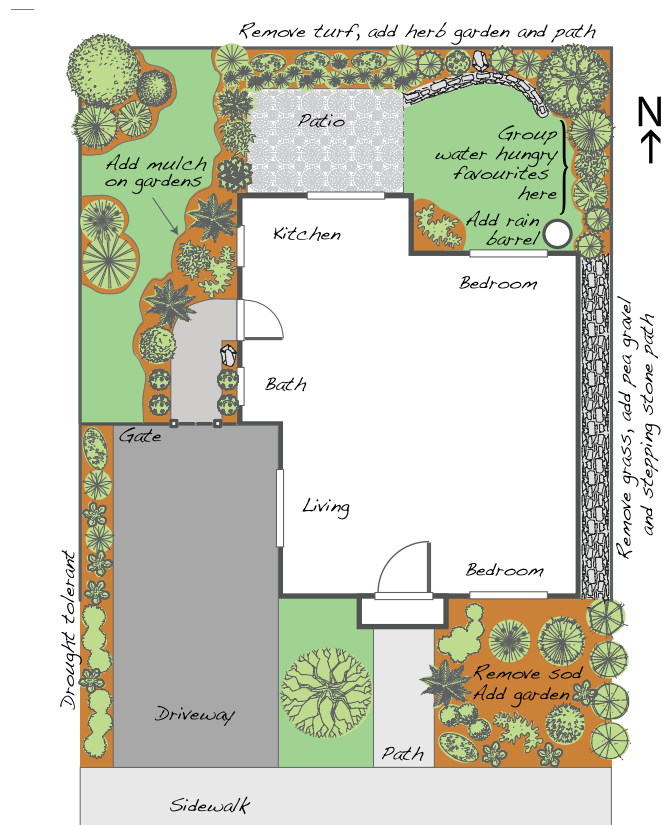


Some things to include in your inventory sketch:

- Take note of existing trees, shrubs, hardscaping (walkways, decks, patios, driveways, fences, etc.)
- Note areas of turf that turn brown at the first sign of hot, dry weather
- Identify plants that need constant watering and/or wilt on a regular basis without water.
- Note sunlight conditions throughout your landscape. Include which direction is north and which areas get shade from surrounding homes, fences or trees.
- Consider areas that are heavily used by you and your family and those that are rarely visited.

Once you have finished your inventory, you can start to plan your new water wise landscape. Replacing some or all of your lawn with a water wise garden is one of the best ways to save water and reduce the need for pesticides. It will also help you save time in the summer months – time you don't have to spend watering, mowing, fertilizing and weeding your lawn. Lawns can require 2-3 times more water than a well-planned garden. Consider a lawn alternative such as water wise gardens, mulched woodchip or stone areas, porous hardscaping (i.e. interlocking brick), flagstone pathways or shrub beds.

Whatever your goal is, start small. You do not want to be overwhelmed.



# PREPARATION & CHOOSING YOUR PLANTS

## PREPARATION

Soil is the most important part of your water wise garden.

You can make amendments to improve the soil and promote plant health. This will increase the supply of organic matter, improve drainage, increase moisture retention, improve air flow, and decrease water requirements.

The best soil amendment is compost. Compost will help to retain moisture in sandy soils and encourage drainage in heavy clay soil by breaking up the tight structure of the soil. Compost can be applied to any soil as an amendment. If you happen to live on a rock you can always do raised beds, but keep in mind they will need a bit of extra care.

A lot of water is lost to run off on slopes; therefore proper planning can keep the water on the plant where it is needed. If you have a sloping yard, consider terracing it or grading it into a series of level planting areas. Terracing can turn a steep slope into a beautiful water wise garden.

Berms can be a lovely way of adding depth and interest to a garden but significant water will be lost to run off. Don't mound earth into berms between curbs and walks as irrigation will easily run off and be wasted.

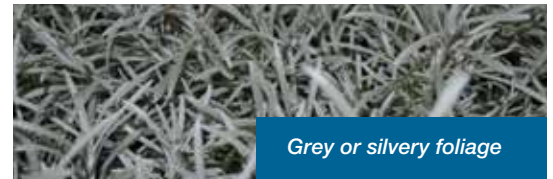
Here are a few tips to make your gardens more water-efficient:

- ✓ Once your perennials begin to emerge in the spring, gently dig up the ones you want to move and place them under a tarp for protection until you are ready to re-plant them in new locations.
- ✓ Add your compost to the soil at a depth of 2-3 inches (5-7 cm).
- ✓ Replant your perennials, grouping them according to their needs. Group your plants according to the specific conditions of each area of your garden and by the amount of water they need. If you have one or two favourite plants that prefer a bit more water, move them to an area of the garden near your rain barrel or tap. This way, you will not have to walk far for watering and you can focus any supplementary watering to just one area of your landscape.
- ✓ For plants that do not need to be moved and for existing trees and shrubs, you can add a layer of compost around the base of each tree to increase the water holding capacity of the soil. The compost will naturally work its way into the ground with the help of earthworms, eliminating the need for you to dig it in. Make sure you don't pile it against the plant stems, which may rot them.

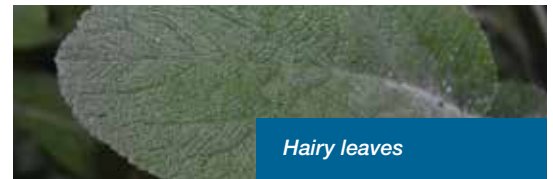
## CHOOSING YOUR PLANTS

### Choosing the right plant for the right place

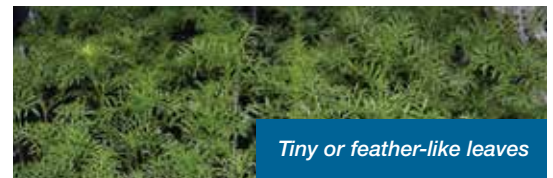
The most important rule to gardening is to plant the right plant in the right place. Since not everyone is a plant expert, learning the specific plant adaptations to save water will help you easily identify water wise plants.



*Grey or silvery foliage*



*Hairy leaves*



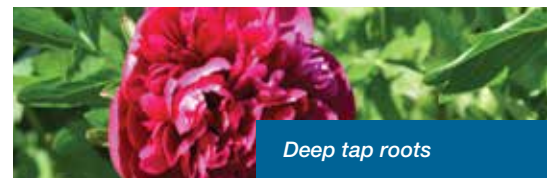
*Tiny or feather-like leaves*



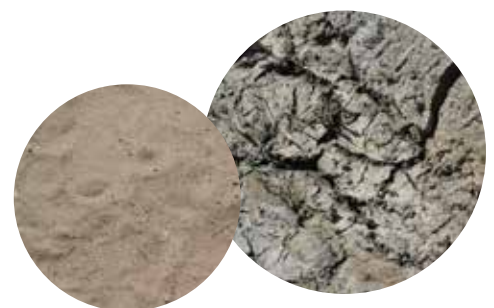
*Succulent leaves*



*Thick, fleshy, root structures*



*Deep tap roots*







Perennials are plants that will come back every year. Look for plants that reduce or eliminate the need for additional irrigation.

#### Exposure Legend

Exposure	Symbol
Shade	S
Partial Sun	PS
Full Sun	FS

By looking for the many characteristics of water efficient plants, you can determine which plants will do well with little or no added water. The more of these traits that the plant has, the more water efficient it will be.

- ✓ Grey or silvery foliage. The leaves of these pale foliaged plants reflect light, and therefore reduce evaporation. Example: Artemisia
- ✓ Hairy leaves. These hairs protect the leaf from water loss due to sun and wind exposure. Example: Lambs ear
- ✓ Tiny or feather-like leaves. Less leaf surface allows for less loss of water due to evaporation. Example: Cosmos
- ✓ Low growing or mounding forms. These plants stay close to the ground to protect their roots from the elements and to stay out of drying winds. Example: Creeping phlox
- ✓ Aromatic leaves. These plants produce oils to protect the plant from drying out. Example: Lavender
- ✓ Succulent leaves. Deeply fleshy leaves allow for the storage of water within the plant allowing it to go long periods without water. Example: Sedum and Hens and Chicks
- ✓ Thick fleshy root structures. These enable the plants to store extra moisture in their roots making them able to withstand periods of drought. Examples: Bulbs and Irises
- ✓ Summer dormancy. Many spring blooming plants and grasses go dormant during the summer to protect themselves from the hot, dry weather. Examples: Spring Bulbs
- ✓ Deep tap roots. These plants develop roots that can extend deep into the soil searching for water. Example: Peonies
- ✓ Rhizome and wide spreading root systems. Example: Arctic Willow

## Perennials

Perennials plants will come back every year. They are able to establish extensive root systems, which make them hardier for the various weather changes. Choosing the right perennials for the right place in your garden will reduce, or eliminate the need for additional irrigation.

## Water Efficient Grasses

Plant	Exposure	Plant Soil			Containers	Rock Gardens	Butterflies /Birds
Blue Fescue <i>Festuca glauca</i>	S-PS	Dry	n/a	25	✓	✓	✓
Bulbous Oat Grass <i>Arrhenatherum elatius bulbosum</i>	S-PS	Any	n/a	40		✓	
Feather Reed Grass <i>Calamagrostis x acutiflora 'Karl Foerster'</i>	S-PS	Any	n/a	150			✓
Fountain Grass <i>Pennisetum alopecuroides</i>	S -PS	Any	n/a	150			✓

## Perennials

Plant	Exposure	Bloom Time	Height (cm)	Containers	Rock Gardens	Butterflies /Birds	Colour
Bearded Iris <i>Iris Germanica</i>	S	Spring and Summer	15-120		✓		Various
Basket of Gold Alyssum <i>Aurinia saxatile</i>	FS	Early spring to mid-spring	15-30	✓	✓		Yellow
Bellflower <i>Campanula spp.</i>	S - FS	Spring, early summer	10-150				White, pink, blue, purple
Black Eyed Susan <i>Rudbeckia spp.</i>	S-PS	Midsummer to Fall	60-180	✓		✓	Yellow, new varieties in red, white, orange
Bitterroot <i>Lewisia spp.</i>	S	Spring- early summer	15-20	✓	✓		Pink, white, purple, orange, yellow, fuchsia
Carpet Bugleweed* <i>Ajuga reptans</i>	S- FS	Late spring to early summer	10-25	✓	✓		Purple sometimes pink or white
Catmint* <i>Nepeta mussinii</i>	S-PS	Spring to Summer	45-90	✓	✓	✓	Purple
Clary Sage <i>Salvia horminum</i>	S	Spring to summer	45-60		✓		Pink, white, purple, mauve, red
Coral Bells <i>Heuchera spp.</i>	S-FS	Spring to Fall	30	✓	✓	✓	Foliage comes in many colours.
Coreopsis /Tickseed <i>Coreopsis species</i>	S	Early to late summer	30-90	✓	✓	✓	Yellow, pink or orange
Cranesbill <i>Geranium sanguineum</i>	PS/S	Summer	20-30		✓		Purple, white, red, pink
Cushion Spurge <i>Euphorbia polychroma</i>	S-PS	Spring to Summer	30-60	✓	✓		Yellow
Dianthus <i>Dianthus deltoids</i>	S-PS	Spring to summer	15-40	✓	✓		Purple, white, red, pink, burgundy
Daylily <i>Hemerocallis spp.</i>	S-PS	Spring to Summer	60-90		✓		All but blue and white
Ozark Sundrop <i>Oenothera missouriensis</i>	S-PS	Spring and summer	30-90	✓	✓	✓	Yellow, pink, white
False Rock Cress <i>Aubrieta deltoids</i>	S-PS	Spring- early summer	5-15	✓	✓		White, pink, purple
Flowering Onion <i>Allium species</i>	S- PS	Spring	20-120		✓	✓	Purple, pink, white
Gayfeather <i>Liatris spicata</i>	S	Summer	50-150	✓	✓	✓	Fuchsia and White
Golden Marguerite <i>Anthemis tinctoria</i>	S	Late spring to late summer	60-90	✓	✓		Yellow, white
Hens and Chicks <i>Sempervivum species</i>	S - PS	Summer		✓	✓		Come in a variety of foliage colours
Hosta <i>Hosta spp.</i>	PS-FS	Summer and Fall	15-90		✓		Foliage comes in a variety of shades. Flowers purple or white
Lady's Mantle <i>Alchemilla mollis</i>	S-FS	Early Summer to early fall	45	✓	✓		yellow
Lavender <i>Lavandula species</i>	S	Late spring to late fall	45-60	✓	✓	✓	purple
Lupine <i>Lupinus spp.</i>	S- PS	Spring and Summer	75-90			✓	Purple, yellow, red, pink, white, cream
Moss Phlox <i>Phlox subulata</i>	S-FS	Early spring	10-30	✓	✓		Pink, purple, white, striped, fuchsia
Oriental Poppy* <i>Papaver oriental</i>	S	Spring, early summer	30-90				Orange, red, pink, white
Penstemon <i>Penstemon spp.</i>	S- PS	Spring to Summer	20-60			✓	White, light pink, purple, yellow
Peony <i>Paeonia spp.</i>	S-PS	Spring to early summer	60-90			✓	White, yellow, pink, red, purple, fuchsia
Pincushion Flower <i>Scabiosa species</i>	S	Summer	60	✓	✓	✓	Burgundy, white, mauve
Purple Coneflower <i>Echinacea purpurea</i>	S	Summer	150	✓		✓	Purple, white, orange, red, yellow
Rose Campion <i>Lychnis coronaria</i>	S- PS	Early to late summer	60-90		✓		Fuchsia, white
Russian Sage <i>Perovskia atriplicifolia</i>	S	Midsummer to fall	120			✓	Purple
Sandwort <i>Arenaria montana</i>	S- PS	Late spring- early summer	3-10		✓		White
Stonecress <i>Aethionema spp.</i>	S	Spring to early summer	5-30	✓	✓		Pink, red, cream, white
Stonecrop <i>Sedum species</i>	S-PS	various	5-60	✓	✓	✓	Yellow, white, red, pink with various colours of foliage
Sweet Woodruff* <i>Galium odoratum</i>	PS-FS	Late spring to early summer	30		✓		White
Thyme * <i>Thymus species</i>	S	Late spring, early summer	15-30	✓	✓	✓	Pink, white, purple
Yarrow* <i>Achillea spp.</i>	S -PS	Summer to early fall	10-120	✓	✓	✓	White, yellow, red, orange, pink

\*Avoid planting near natural areas



Annuals need more water and nutrients than perennials. Choose annuals that are more water efficient to reduce the need for excess water.

## Annuals

Annuals need to be re-planted every year, but can sometimes self-seed depending on type. Annuals are a popular choice as they bloom continuously throughout the summer. The quick growth and constant blooming takes up a lot of the plant's resources. This means that annuals need more water and nutrients than perennials. Choose annuals that are more water efficient to reduce the need for excess water.

Plant	Exposure	Height (cm)	Containers	Rock Gardens	Butterflies /Birds	Colour
Dahlberg Daisy <i>Dyssocua tenuiloba</i>	S	20	✓	✓		Yellow
Gazania <i>Gazania splendens</i>	S	40	✓	✓		Yellow, Pink, Orange, Red
Lantana <i>Lantana camara</i>	S - PS	100	✓	✓	✓	Red, orange, pink, white, yellow
Portulaca <i>Portulaca oleracea</i>	S	10-15	✓	✓		Red, pink, white, yellow, orange
Strawflower <i>Bracteantha species</i>	S	60	✓			Yellow, orange
Cosmos <i>Cosmos bipinnatus</i>	S - PS	80-120		✓	✓	Pink, white,
California Poppy <i>Eschscholzia californica</i>	S	45	✓			Orange, pink, white, yellow, cream
Statice/Sea Lavender <i>Argemone grandifolia</i>	S	20-70	✓		✓	Purple, blue, white, fuchsia, light pink, yellow, orange
Geranium <i>Pelargonium species</i>	S- PS	50-100	✓			Pink, red, white, purple
Marigold <i>Tagetes erecta</i> <i>Tagetes, patula</i>	S	20-90	✓	✓	✓	White, yellow, orange

### Exposure Legend

Exposure	Symbol
Shade	S
Partial Sun	PS
Full Sun	FS



# ANNUALS & NATIVE PLANTS



## Native Plants

A native species is one that evolved in British Columbia. This means that the species is well suited to the local conditions and climate, often resistant to pest, disease and harsh weather. They are generally low maintenance and do not require pesticides. Not all native plants are good in dry areas. Some prefer moist areas, similar to those found in wetlands, marshes and bogs.

Plant	Exposure	Bloom Time	Height (cm)	Containers	Rock Gardens	Butterflies /Birds	Colour
Yellow Mountain Avens <i>Dryas drummondii</i>	S	Spring to summer	25		✓	✓	Yellow
Eight-Petal Mountain Avens <i>Dryas octopetala</i>	S	Summer	15		✓	✓	White
Common Woolly Sunflower, Oregon sunshine <i>Eriophyllum lanatum</i>	S	Spring/early fall	15			✓	Yellow
Wild Bergamot, Bee Balm <i>Monarda fistulosa</i>	S	Summer to Early Fall	120			✓	Pink/Mauve
Prickly Wild Rose <i>Rosa acicularis</i>	S-PS	Mid Spring- Mid Summer	150			✓	Pink
Little Bluestem Grass <i>Schizachyrium scoparium</i>	S-PS	n/a	50-75	✓	✓	✓	n/a
Sand/ Prairie Dropseed <i>Sporobolus cryptandrus</i>	S	n/a	30-60		✓		n/a
Heath Aster <i>Symphyotrichum ericoides</i>	S-PS	Late Summer/Fall	60-80	✓		✓	White
Smooth Blue Aster <i>Symphyotrichum laeve</i>	S-PS	Late summer/Fall	60-80			✓	Light purple
Silver Stem Lupine <i>Lupinus argenteus</i>	S	Mid Spring- Early summer	100			✓	Purple
Lanced Leaved Coreopsis <i>Coreopsis lanceolata</i>	S	Late spring, summer	30-50	✓		✓	Yellow
Bearberry, Kinnikinnick <i>Arctostaphylos uva ursi</i>	PS-FS	Spring	10		✓	✓	White
Pearly Everlasting <i>Anaphalis margaritacea</i>	S	Mid- to late summer	20-90	✓	✓	✓	White
Common Thrift <i>Armeria maritime californica</i>	S	Late spring to early summer	20	✓	✓	✓	Pink or White
Arrowleaf Balsamwort <i>Balsamorhiza sagittata</i>	S	Mid-Spring to late summer	30		✓	✓	Yellow
BC Wild Ginger <i>Asarum caudatum</i>	PS-FS	Early Spring	20		✓	✓	Burgundy



Exposure Legend

Exposure	Symbol
Shade	S
Partial Sun	PS
Full Sun	FS



Adding mulch to your garden is likely the single most effective way to reduce a garden's water needs and reduce weeds!

#### Exposure Legend

Exposure	Symbol
Shade	S
Partial Sun	PS
Full Sun	FS

## Trees and Shrubs

There are many benefits to trees and shrubs in your landscape. Trees and shrubs help clean the air, reduce summer heat, provide protection from the sun, provide habitat, increase property values, decrease evaporation in the summer and improve the aesthetics of your landscape.

## Water Efficient Shrubs

\*indicates Native to BC

Plant	Exposure	Bloom?	Bloom Time	Height (m)	Width (m)	Beneficial for wildlife
Common Juniper <i>Juniperus species</i>	S-PS	Blue	Spring	0.5-5	varies	✓
Bayberry <i>Myrica pennsylvannica</i>	S-PS	Yellow		3	2	✓
Beauty Bush <i>Kolkwitzia amabilis</i>	S	Pink		3	2.5	✓
Blue Elderberry <i>Sambucus cerulea</i>	S-PS	White	Spring	5-10		✓
Bridal Wreath Spirea <i>Spirea x vanhouttei</i>	S	White	Spring	2	3	✓
Cutleaf Sumac <i>Rhus typhina dissecta</i>	S-PS	Red		7.5	4.5	✓
Fragrant Sumac <i>Rhus aromatica gro-low</i>	S-PS	Yellow		1	75	✓
Mugo Pine <i>Pinus mugo</i>	S-PS	n/a	n/a	3	1	✓
Nootka rose <i>Rosa nutkana</i>	S	Pink	Spring, early summer	1.5		✓
*Oregon Grape <i>Mahonia aquifolium</i>	PS	Yellow				✓
Peking Cotoneaster <i>Cotoneaster acutifolius</i>	S-PS	White Pink	Spring	0.5	2	✓
*Saskatoon Berry <i>Amelanchier alnifolia</i>	S-PS	White	Spring			✓
*Scouler's willow <i>Salix scouleriana</i>						✓
Smoke Bush <i>Cotinus coggygia</i>	S-PS			5		✓
Snowberry <i>Symphoricarpos albus</i>	S-PS	Pink/white		1.5	2	✓
*Soapberry <i>Shepherdia canadensis</i>						✓
Virginal Mock orange <i>Philadelphus cultivar</i>	S-PS	White	Early Spring	3	1.2	✓
Wayfaring Tree <i>Viburnum lantana</i>	S-PS	White	Spring	5	3	✓

## Water Efficient Trees

There are countless trees, both native and non-invasive ornamentals that can be grown in Abbotsford and Mission. To find the perfect tree for your property, visit your local garden centre. Once established, most mature trees will withstand some drought.

## MAINTENANCE

### Lawn Care

The best way to create a healthy, water wise lawn is to do the following maintenance each year:

**Aerate** - Soils with heavy clay, silt or loam content can get compacted over the seasons, restricting air, water, and compost from getting to the plant roots. To relieve compaction in turf areas, aerate. This is a process in which plugs of soil are removed from the lawn. Aeration can be done in the spring or in the fall, and should be done every year for heavily compacted soils or every 2 -3 years for less compacted soils. Aerating will also reduce thatch that has developed in the turf. Sandy or rocky soils do not need to be aerated.

**Top dress** - Top dress your lawn annually, especially after aerating. Adding a layer of good quality compost, to a depth of no more than 1.5 cm (¼ inch) will add much needed organic matter to your lawn.

**Overseed** - Overseed your lawn with grass seed varieties that are better adapted to dry summers including fescues and perennial rye grasses. This should be done at the same time as your top dressing, at least once a year. Thickening your lawn with these grass types improves the water-efficiency of your lawn and strengthens it for defense against weeds and pests.

**Increase Mowing Height** - Set your lawn mower height at 5- 7.5 cm (2-3 inches) to encourage deep roots. The longer grass will also shade the grass roots and reduce water evaporation from the soil surface. This is particularly important during the dry, hot weather.

### Mulching

Adding mulch to your garden is likely the single most effective way to reduce a garden's water needs.

Adding and maintaining mulch to a depth of 5- 7.5 cm (2-3 inches) to your garden will greatly reduce the amount of water lost to evaporation and significantly reduce weeds.

There are two groups of mulch:

**Organic:** Includes chipped or shredded wood, pine needles, cocoa-bean hulls, compost, leaves, and straw. Organic mulch decomposes into your soil to add important organic matter for your plants. \*Note some cocoa bean hulls may be toxic to pets.

**Inorganic:** Inorganic materials include stones and rubber chips. Inorganic mulch will reduce moisture loss, but will not improve soil conditions or add nutrients to your garden.

### Manual Watering - Gardens

Since you have properly planned, prepared and planted your garden to make sure the right plant is in the right place, watering your gardens should be very easy. Deep watering once a week, for the first 3-4 weeks will help your new plants get established.

With good compost, a deep layer of mulch and well-chosen water efficient plants, your garden should be fine with natural rain fall, unless there is an extended period of drought, or if they are newly planted.



Overseed your lawn with different grass seed options.



Without mulch, soil dries out very quickly.



Wood chips used for mulching.





A well-cared for lawn should not need pesticides or frequent watering. A healthy lawn will have strong, vigorous roots that will withstand dry periods, out-compete weeds and be better able to survive counter attacks by pest and disease than those that are chemically treated.

The best method for watering gardens is with a soaker hose. The hose can be placed above the soil, but beneath the mulch. This directs water to the roots of the plant, where it is needed. To check how much water has been applied, gently dig down a few inches to make sure the water has reached a soil depth of at least 7- 10 cm (3-4 inches).

### **Manual Watering - Lawns**

Lawns grow best in the spring. During the hot summer, the lawn begins a dormancy phase and may turn brown as an adaptation to the heat and drought. You can choose to let your lawn go dormant, or choose to keep it “awake” for the summer by adding supplemental water. If it has not rained, water your lawn once a week with about 2.5 cm (1 inch) of water.

To judge how much water your lawn has received, either by hand, or from rain, use a rain gauge or an empty tuna can.

### **Vegetable Garden Watering**

Vegetable and fruit gardens can also be water wise. Most vegetables need some watering to reach their full potential. However, with a few simple practices, the water needs of your vegetable garden can be greatly reduced. Similar to your established lawn, 2.5 cm (1 inch) of water per week should be enough. New seedlings will need to be watered more frequently, and vegetables grown in very sandy soil may prefer smaller amounts of water spread throughout the week.

You can use hydrozoning for your vegetables too. Don’t waste water on herbs such as rosemary, sage, oregano, winter savoury, and thyme, whose flavour is actually improved if grown in hot, dry conditions. Perennial vegetables such as asparagus and rhubarb do not need frequent watering. For maximum water penetration, prepare a flat soil surface. Raised areas such as hills dry out more quickly, and water runs away from the root zone and is wasted.

### **Rain Barrels**

Rain barrels are an excellent way to capture rainwater for use in the garden. The basic principle behind rain barrels is that you place one under a downspout, and every time it rains, you’ll store water for future use.

Rain barrels and diverter kits (to connect the down pipe to the rain barrel) may be purchased through the City of Abbotsford and the District of Mission. They are available for purchase at:

\* Abbotsford City Hall 32315 South Fraser Way

\* Mission City Hall 8645 Stave Lake Street

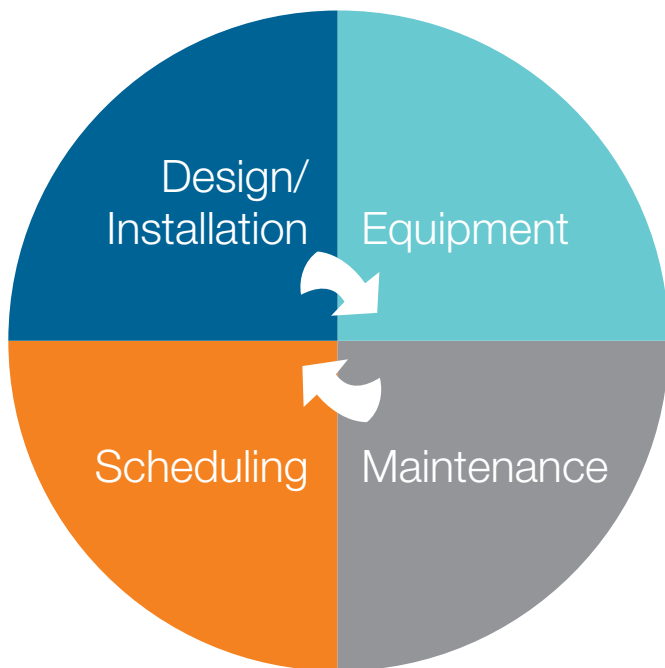
More information on the rain barrel purchase program is available online at [www.ourwatermatters.ca](http://www.ourwatermatters.ca).

# SMART IRRIGATION SYSTEMS

## SMART IRRIGATION SYSTEMS

The smart reality of Irrigation Systems is that we can use less water to enjoy healthy beautiful landscape if we are smart about it.

### The Four Steps to Water Efficient Irrigation

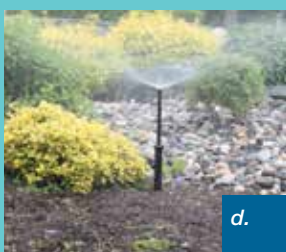


*Use a rain gauge to judge how much water your lawn has received.*



*Vegetable and fruit gardens can also be water wise.*

A common misconception is that irrigation systems waste water. Audits and assessments of installed irrigation systems across Canada have revealed four areas of deficiency in systems: design and installation, irrigation system equipment, scheduling and maintenance. Water efficiency can be realized by focusing on these four key areas of an irrigation system and focusing on providing water directly to the root zone of the landscape, be it garden beds, trees, shrubs or turf grass.



**There are 4 areas of irrigation efficiency to consider:**

## **1. Efficient Design and Quality Installation**

Do you have the right sprinkler system for each area of your landscape? Hopefully your irrigation system was designed by an experienced designer or a Certified Irrigation Designer (CID) who has proven experience and education to establish irrigation specifications, design drawings for irrigation projects and provide direction to the end user on system use, scheduling and maintenance. It is important to understand your site conditions and your water use requirements. Be sure your designer creates a plan with water-efficiency in mind.

**a. Poor design= poor uniformity:** This leads to over-irrigating and using significantly more water than you need! This means that the system is scheduled to run longer than required because it is not covering some areas of landscape. It is not the fault of the irrigation system, it is the poor design.

**b. Head to head coverage & precipitation rates:** Efficient irrigation designs are created with matched precipitation rates in mind, distributing the water evenly among the landscape. Water is wasted when there is an inefficient system that over waters to compensate for those areas not getting enough water. This can result in water-run off and longer than required watering times. Save water and your dollars by investing in an irrigation design and system that is completed by a certified professional.

**c. Available water pressure:** Your hydraulics determines the pressure you have and what equipment will be best for your property. Rotor pop-ups provide optimal performance within pressure ranges by manufacturers recommendations that are approximately 40-50 psi and spray pop-ups perform best at pressure range of 25-30 psi .

**d. High water pressure:** This can result in overspray onto non-target landscape and low pressure can cause your sprinklers to run inefficiently.

**e. Matched precipitation rates:** When replacing parts of an irrigation system, it is important that the performance of the replaced parts be identical to the components with the same emitter precipitation rates. When an irrigation system is designed and installed, the equipment should be consistent and uniform. If you have a spray zone, be sure that the sprays are the same type and precipitation rate for the area it is watering.



# SMART IRRIGATION SYSTEMS

## 2. Water-Efficiency & Irrigation System and Equipment

New and improved irrigation equipment is being introduced each year. Your irrigation system is only as good as your design and equipment. Your landscape may have different watering needs and you want to ensure that the water is targeting your landscape and soil directly so that your plant roots are benefiting from the water. Equipment to consider:

**a. Controllers:** There are various controllers that are being updated with more advanced features. The most efficient are controllers with water-conserving functions and operate on real-time weather data and evapo-transpiration (ET). You can also connect rain sensors and moisture sensors to the controllers for additional data so that you are using mother nature to your advantage. Your controller will need to be capable of wiring additional sensors to make it more efficient at watering.

**b. Rotors and sprays that are water efficient:** There are spray and rotor bodies that can prevent drainage from sprinklers located at lower elevations, resist dirt and grit from the environment, can be easily cleaned without replacing parts and are pressure regulated.

**c. Spray nozzles with spray patterns/orientation:** There are various spray nozzles available for a reason. Nozzles that are easy to adjust, reliable and can be easily maintained are best. Rotary nozzles provide less overspray in windy conditions due to large water droplets. Rotary nozzles reduce water run-off due to lower precipitation rates. Nozzles are available in diverse patterns and precipitation rates that can target unique shapes of landscape. They are also capable of “throwing” or applying the water at required lengths, typically from 5 to 15 feet.

**d. Pressure regulation:** Sprays and rotors can now be purchased with pressure regulation inside the body of the sprinkler. If you have high pressure in your irrigation system, there are ways to reduce pressure at the valves and/or the sprinkler head. You can also find drip zone kits that include a valve pressure regulator.

**e. Mitigate water run-off at bottom of slopes:** Eliminate low head drainage from sprinklers that are at the base of slopes or hillsides. Many manufacturers have sprinkler bodies that are designed with a check valve in the base of the sprinkler body. Where there are several sprinklers located on various elevations, a check valve will ensure that water does not leak out from sprays at lower elevations. If you have a landscape with changing elevations, this is an important piece of equipment to install.

**f. Drip irrigation:** If you are having difficulty with overspray or sloped garden beds, this is a low cost solution over the long run. With many flow rate options for different types of landscape, you can use this equipment to water directly at the root zone. With various types of emitters, pressure regulation and filtration options, this type of irrigation is the most water efficient as it will water slowly, deeply and effectively with some only using 1.5 - 2.3 litres per hour without losing water to evaporation. Watering your plants at the root also helps reduce disease on the leaves.





g.



h.



i.



j.



k.



l.

**g. Rain sensors and moisture sensors:** Sensors allow you to be smarter with your irrigation system by incorporating rainfall and moisture. When a rain sensor detects rainfall, it sends a signal to the controller that will shut the controller off. When a moisture sensor reaches a preset moisture level in soil, it sends a signal to the controller to postpone irrigation.

**h. The “right” valves:** Efficient valves not only regulate your water pressure/flow, but filter water and flush the irrigation system of dirt or debris. Cheaper is not always better. Your valves may save you money.

**i. Water-proof wire connectors in valve box:** Wires should be protected in your valve box with grease filled/water-proof connectors to prevent any electrical or short-circuit issues in your irrigation system. To prevent this, **DO NOT** use electrical tape and/or common wire connectors as this wiring is not suitable for underground irrigation.

**j. Backflow-Prevention devices:** Backflow prevents the reverse flow of water in your drinking water supply line. Without a backflow preventer, there are great health risks due to the risk of chemical contaminants flowing backwards into your drinking water. This unit is required to be a “testable” device that should be tested annually when your irrigation system is turned on.

**k. Pressure-regulating devices:** Connections in your irrigation system can leak if the pressure is not regulated. These devices help sustain the longevity of your irrigation system. By regulating the pressure of your irrigation system, you will have a less chance of leakage at the connections.

**l. Master valves:** A master valve is a valve that is installed on the main pipe, upstream of the zone valves. This valve remains closed when the irrigation system is not in operation. The master valve is typically installed inside the residence/building before the main pipe exits the residence/building or on the main pipe immediately outside of the residence/building wall. If there is a break or leak in the main pipe between the master valve and the zone valve, the master valve can act as a “failsafe” to ensure that pressurized municipal water does not escape when the irrigation system is off. If the incoming municipal pressure is high, a pressure regulator can be added to a master valve. The pressure regulator will reduce the pressure throughout the entire system.

# SMART IRRIGATION SYSTEMS

## 3. Scheduling

The irrigation controller is the brain of the irrigation system. The controller tells the irrigation system what to do and when. With timer controllers, we make assumptions of when and how often our landscapes should be watered. With the addition of sensors and weather data, we can make these controllers more efficient. Sensors provide real-time weather feedback to the controller. With local watering regulations, our gardens are not confined to specific water times, only our lawns. Consider revising your irrigation schedule or ask your contractor for help.

**a. The irrigation brain:** The controller is what controls and turns on the irrigation system and sends an electric signal to your valves to operate and water your landscape. Controllers are either simple timer controllers or advanced computerized controllers. Controllers that allow for multiple programs and watering times are a smart choice. Be sure your controller allows you to connect a sensor.

**b. Wind and water don't mix well:** Not only will the wind distort the spray pattern; your landscape will not be watered evenly. So if it's windy, avoid wind drift by turning the dial of the irrigation system to off or delay watering. If you have a wind sensor, this will be done automatically.

**c. Sense the rain and moisture:** If you don't have a weather based ET controller, the sensor can automatically shut off irrigation once your rain sensor is damp from precipitation. It will signal your controller and you will save water. A moisture sensor can determine if your soil is still damp and if it requires more water.

**d. Easy does it; just cycle and soak:** Your irrigation schedule will be based on your soil and how fast or slow the water infiltrates into the soil. Don't run your irrigation cycle for long periods of time if you have clay soil. Your soil needs time to absorb the water. Watering for too long will result in water run-off and wasted water. The landscape root zones will not receive the benefits of the water and you will waste money with water run-off that is not being used by your landscape.

**e. A Certified Irrigation Scheduler (CIS)** can also assist with proper scheduling. Courses are available through the Irrigation Association of BC at [www.irrigationbc.com](http://www.irrigationbc.com)



*The irrigation brain; the controller*



*Not only will the wind distort the spray pattern; your landscape will not be watered evenly.*



*By regulating the pressure of your irrigation system you will have a less chance of leakage at the connections.*





Once your irrigation system is installed, you still need the professionals to check-in and service it to ensure your irrigation system is operational and landscape will be cared for. An irrigation system and a controller/timer is not enough. Your system will require maintenance and follow-up.

#### 4. Maintenance

**Maintenance and irrigation check-ups are key!** Once your irrigation system is installed, you still need the professionals to check-in and service it to ensure your irrigation system is operational and your landscape will be cared for. An irrigation system and a controller/timer is not enough. Your system will require maintenance and follow-up.

**a. Smart start-up:** When the spring is here and the rain is less, be sure to complete your spring-start up using an irrigation professional.

**b. Be irrigation aware:** An efficient irrigation system needs to be in good operating condition. The controller “Brain” will still schedule your sprinklers to turn on. You can keep an eye on your irrigation system by turning your controller off should there be high winds or turn it on to look for anything out of the ordinary, such as misaligned sprinkler heads aimed at the side of the house, missing sprinkler heads and nozzles that are providing a fountain display for the neighbours or valves that may be leaking or not operating. Be observant and avoid wasting water.

**c. Winterizing your irrigation system:** When water freezes and expands the pipe will crack and burst. Avoid unnecessary damage, larger irrigation repairs, wasted water and dollars by winterizing your system at the end of the irrigation season.

**d. There is an irrigation doctor:** It is called a Certified Irrigation Contractor! Inquire to see if your contractor is a Certified Irrigation Technician or Certified Irrigation Contractor through your Irrigation Association at: [www.irrigationbc.com](http://www.irrigationbc.com)



# COMMON DEFICIENCIES & SOLUTIONS

## COMMON DEFICIENCIES & SOLUTIONS

You may have a smart designed irrigation system and equipment and still experience water leaks and wasted water.

### Deficiency examples:

1. Damaged equipment parts caused by landscape maintenance such as aeration and lawn mowing.
2. Irrigation pipe is broken or cracked. This could be caused by not winterizing or improper irrigation system installation. If the irrigation system was not “winterized” or blown out before the winter season, this will leave water in the pipe to freeze in the winter. Freezing in the pipe will cause the pipe to crack underneath the soil. Improper installation can result in future repairs if the irrigation pipe was not glued or clamped properly.
3. Irrigation system is off but there is water still leaking from a spray head. If the spray head is at the bottom of a slope, water that is in the pipe will continue to escape from the irrigation line until it is empty. This can cause issues with landscape erosion and flooding. A pressure reducing spray head with a check valve will prevent drainage of water and will stop you from wasting water.

### Common Deficiencies & Solutions

1. **The wrong nozzle and spray pattern for the landscape being targeted by water:** Some areas require different spray patterns if using a spray nozzle or rotary nozzle.
2. **Overspray:** Consider using rotary nozzles or drip irrigation depending on the landscaped area.
3. **Alignment issues:** Ensure that your spray head or rotor is targeting the intended landscape. You may want to consider drip irrigation.
4. **Leaks:** If the sprinkler head is leaking water at the lowest head on the zone, consider installing a sprinkler head with both pressure regulation and a check valve that creates a water tight seal so that water does not escape at this point. If water is leaking around the base of the sprinkler head, it could be from a leak due to a damaged wiper seal.
5. **Broken or cracked equipment:** Broken sprinklers, pipes or valves can result in water pooling in landscaped areas.
6. **Over watering and water-run off:** Consider installing a rain sensor and/or moisture sensor. Be sure to investigate the many options of sensors available. Look at your schedule and consider cycle & soak for zones that don't absorb the water as fast as it is applied.
7. **Broken equipment:** Broken equipment such as spray heads, pipes, valves, and zones with no check valves can result in wasted water.
8. **Low pressure:** This could be due to a leak, the type of equipment used for the size of the water source, the hydraulics not working properly, etc. You may need to hire a an irrigation contractor to correct this problem.



Undetected leaks from missing sprinkler heads can waste over 6 GPM of water.



Deficiencies including broken sprinkler equipment such as spray heads, pipes, valves, and zones with no check valves can result in wasted water.



Be sure to ask your contractor if they are a Certified Irrigation Contractor (CIC) or a Certified Irrigation Technician (CIT) if they are installing and/or servicing your irrigation system.

### Qualified Professionals:

Some problems with the installations and service of irrigation systems are due to lack of experience. Ask your contractor if they are a Certified Irrigation Contractor (CIC) or a Certified Irrigation Technician (CIT) if they are installing and/or servicing your irrigation system.

### Maintenance: To Do Checklist

- ✓ Run each zone, be observant and complete a full inspection of your sprinklers.
- ✓ Check each nozzle and pop-up for blockage, clogs, cracks and breaks.
- ✓ Thorough inspections are especially critical for those who may have forgotten to winterize their systems.
- ✓ Is your program set according to your local sprinkling regulations/watering days and times for your area?
- ✓ Ensure your sprinklers are watering what they are supposed to water! Not the siding of your house or the sidewalk.
- ✓ Are your watering run times excessive?
- ✓ Check your valve boxes for excess water, correct wiring and waterproof connectors.
- ✓ Make note of excessive water and puddles in unusual areas.
- ✓ Purchase the correct nozzles required by the landscape so that the water targets the appropriate landscape.
- ✓ Consider sprinkler heads that include check-valves and pressure regulation to avoid water run-off in locations such as the base of hills and slopes.
- ✓ Consider drip irrigation for your garden beds, where water at the base of the plant is beneficial and avoids overspray.
- ✓ Add a rain sensor and/or moisture sensor to determine when your landscape has enough water.
- ✓ Consider a rainbarrel for irrigation.
- ✓ Look into weather-based technologies to utilize real-time weather and rainfall to save water.

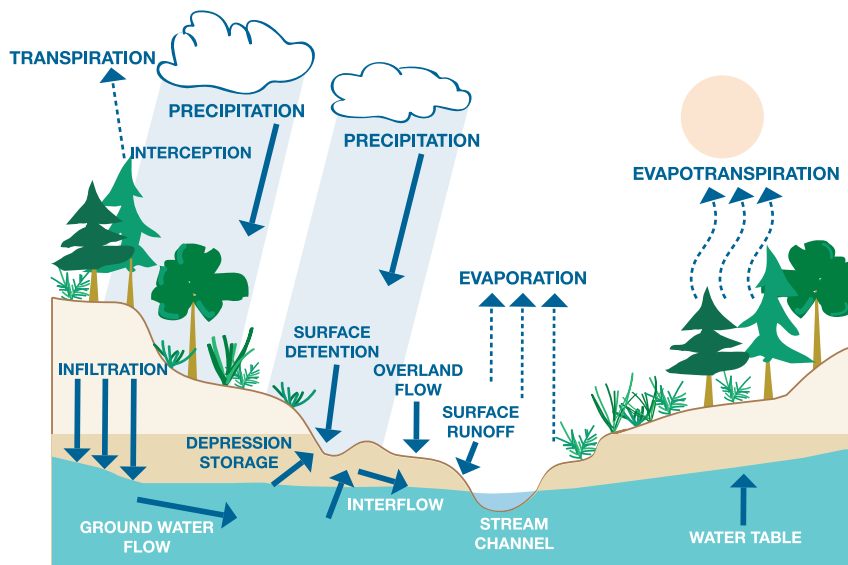


# WEATHER PATTERNS & EVAPO-TRANSPIRATION

## Weather Patterns & Evapo-Transpiration

Weather can play an integral part in the Abbotsford/Mission climate in saving water. Plants respond to current weather conditions. What evaporates from the soil and transpires from the plants is called evapo-transpiration, otherwise known as ET. (see diagram below)

ET calculations are derived from weather stations that track climate data including solar, air/wind, temperature and humidity.



*Illustration from Columbia, [www.columbia.edu](http://www.columbia.edu)*

Using this information, plus tracking and monitoring rainfall, can provide you with accurate knowledge for the controller. With current irrigation controllers that use ET information, proper watering or non-irrigation can be decided for you without touching your controller. In order to effectively use weather based systems, you need to fully understand the combination of plant materials, soil types and sprinkler systems. A Certified Landscape Irrigation Auditor (CLIA) can assist you with the landscape/irrigation information you will need to program your controller.

If considering a weather-based irrigation system, ensure that your weather data is current, located close to your own property and the weather station is on the ground. The weather should not be using historical data as weather is changing daily. Your weather data must come from a trusted source that is continually maintained for accuracy.

For more information on irrigation calculators including landscape, weather and soil calculators, visit [waterbucket](http://waterbucket.ca) at [waterbucket.ca](http://waterbucket.ca). the Irrigation Association of BC at [www.irrigationbc.com](http://www.irrigationbc.com) and Farmwest Climate Data at [www.farmwest.com](http://www.farmwest.com).



*Weather station's provide current, accurate data for weather-based irrigation systems.*



## CITATIONS & REFERENCES

### Partners

**SMART Watering Systems:** [www.smartwateringsystems.ca](http://www.smartwateringsystems.ca)

Provided audit and assessment research in addition to retrofit results.

**RMSI:** [www.rmsi.ca](http://www.rmsi.ca)

**Tanglebank Gardens:** [www.tanglebank.com](http://www.tanglebank.com)

### Irrigation Professionals

**Irrigation Association of North America:** [www.irrigation.org](http://www.irrigation.org)

**Irrigation Association of BC:** [www.irrigationbc.com](http://www.irrigationbc.com)

**Certified BC Irrigation Professionals:** [www.irrigationbc.com/Certified-Professionals](http://www.irrigationbc.com/Certified-Professionals)

### Photos, Diagrams & Graphs

**Columbia:** [www.columbia.edu](http://www.columbia.edu)

**Farmwest Climate Data:** [www.farmwest.com](http://www.farmwest.com)

**Eldorado County Weather:** [www.eldoradocountyweather.com](http://www.eldoradocountyweather.com)

**Waterbucket:** [www.Waterbucket.ca](http://www.Waterbucket.ca)

### Manufacturers

**Hunter:** [www.hunterindustries.com](http://www.hunterindustries.com)

**Irritrol:** [www.irritrol.com](http://www.irritrol.com)

**Rainbird:** [www.rainbird.com](http://www.rainbird.com)

**Toro:** [www.toro.com](http://www.toro.com)

# NOTES SECTION





