

DESIGN A NATIVE PLANT GARDEN



KEY CONCEPTS

- SUSTAINABILITY OF GREATER VICTORIA WATER RESOURCES REQUIRES CONSERVATION AND BEST MANAGEMENT PRACTICES.
- RESPONSIBILITY FOR WATER IS EVERYONE'S CONCERN.

METHOD

Students design a native plant garden for their school and present a poster of their design.

ACTIVITY INFORMATION BOX:

TIME REQUIRED: 120 minutes plus optional student research and design time;

GRADE LEVEL: Grades 8-12

KEY WORDS: *native plant, water conservation, drought tolerant, water efficiency*

MATERIALS:

- Paper, pens / coloured markers
- Background Material
- Native Plant Garden Site Observation Sheet
- Soil Test Sheet (optional)
- Plant Propagation Lab (optional)

SETTING: indoors and outdoors

SKILLS: communicating, discussion, analysis, interpretation, observation, drawing

SUBJECTS: Science 8-10
Biology 11, 12

LEARNING OUTCOMES:

IT IS EXPECTED THAT THE STUDENT WILL:

- Identify local native plants;
- List options for less water intensive landscapes;
- Identify at least three types of water conservation practices.

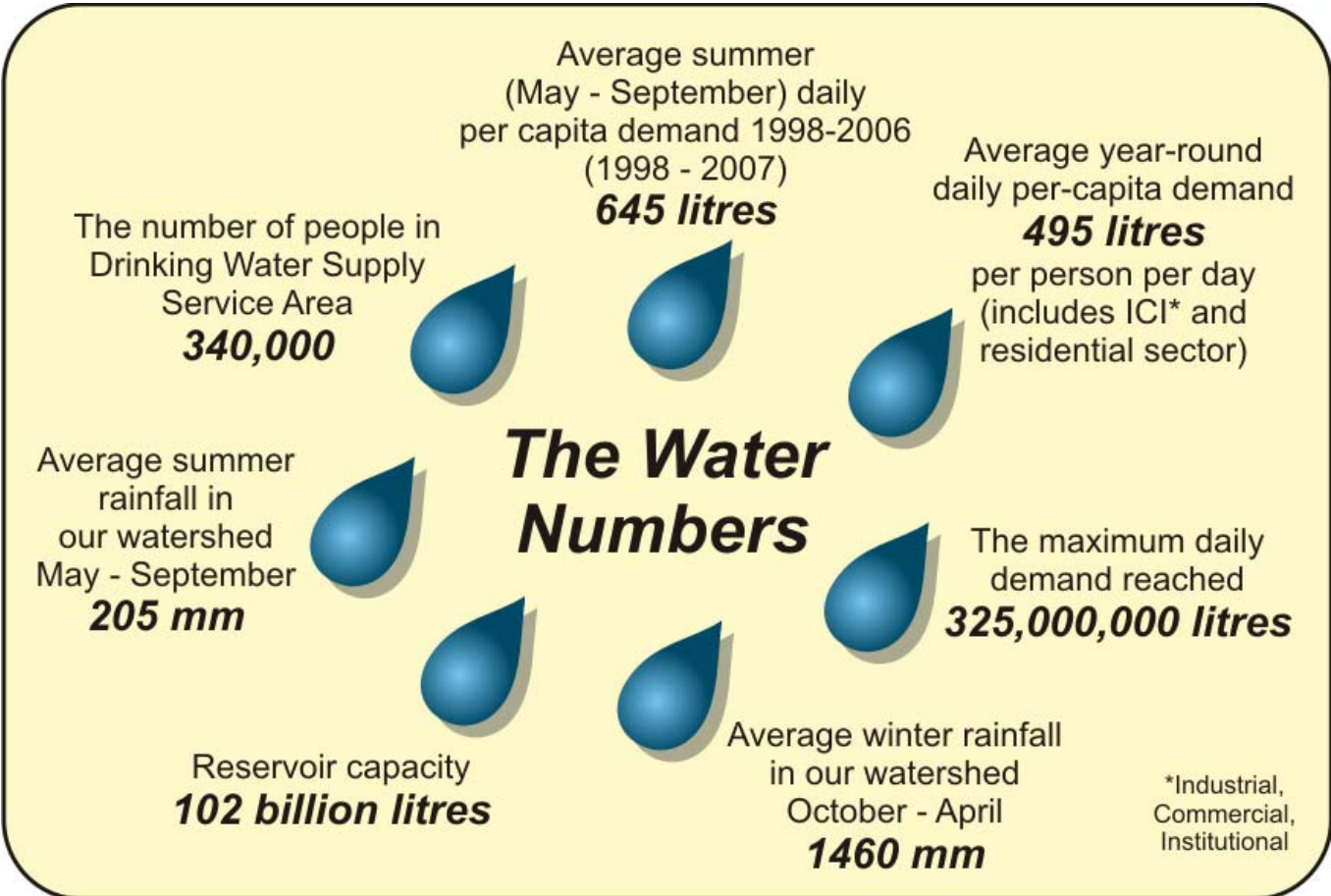


BACKGROUND

Drinking water use in Greater Victoria more than doubles in the summer months. The Greater Victoria Water Supply Area barely receives an average of 205 mm of rainfall in the summer, when the demand for water is the highest. Compare that to an average winter rainfall of 1460 mm, and you can understand the challenge we face. All of our water supply comes from reservoirs that are replenished during the winter months and have limited capacity. This means that no matter how long and hard it rains, we can only capture a limited supply during those rainy winter months. If we have a drier winter and our reservoir levels are low to start with, there is little chance that summer rainfall will make up the difference.

Greater Victoria enjoys a wonderful climate for growing gardens and the region is famous for our gardens and gardeners. However, the largest drain on our water supply during the summer months is outdoor use - mostly lawn and garden watering. We increase the amount of water used in the summer by almost 100% over winter use. Local studies show that as much as 65% of water used for irrigation is wasted through inefficient watering practices. One way to increase our water efficiency is to plant a garden with native plants that needs less irrigation and are adapted to our local soils and climate.

In this activity, students will design a garden with water conservation and wildlife habitat in mind. The principles of efficient water use in the garden make great sense - indeed, they're simply good gardening practice! Sometimes this type of garden is called a "*Water-wise Garden*." The design of such a garden usually incorporates water-efficient watering practices, soil health maintenance techniques, and the selection of appropriate plant species to create healthy, beautiful gardens. A native plant is one that occurs naturally in our region as opposed to the many plants that have been introduced by settlers, farmers, and gardeners. Native plants are adapted to growing in our soils and climate and, as a result, tend to do well in our dry summers if planted in an appropriate way. In addition, they provide food, shelter, and nesting sites for wildlife. Native plants are particularly valuable for native animals because they help wildlife survive in areas of urbanization or habitat fragmentation. Making a native plant garden not only conserves water but increases wildlife habitat - a "win/win" situation.





GREATER VICTORIA NATIVE PLANT GARDEN

<p>Sitka Mountain Ash 14</p>	<p>Honeysuckle 16</p>	<p>Aster 18</p>	<p>Pearly Everlasting 20</p>	<p>Sword Fern 22</p>	<p>White Fawn Lily 24</p>
<p>Fireweed 13</p>	<p>Nodding Onion 5</p>	<p>Nootka Rose 17</p>	<p>Red Flowering Currant 19</p>	<p>Evergreen Huckleberry 21</p>	<p>Strawberry 23</p>
<p>Camas 2</p>	<p>Vine Maple 4</p>	<p>Kinnikinnik 6</p>	<p>Snowberry 8</p>	<p>Salal 10</p>	<p>Bunchberry 12</p>
<p>Douglas Fir 1</p>	<p>Red Columbine 3</p>	<p>Oregon Grape 5</p>	<p>Rhododendron 7</p>	<p>Trillium 9</p>	<p>Violet 11</p>



PROCEDURE

Prior to class, gather the following background material:

- CMHC Household Guide to Water Efficiency;
- Naturescape British Columbia – the Provincial Guide: Caring for Wildlife Habitat at Home;
- A Homeowners Guide to Outdoor Water Use;
- Native Plant Garden Design – student background information (pg. 153 & 154)

IN THE CLASS,

1. Introduce the concept of the need for converting water-intensive landscapes to landscapes that use less water. Refer to the following information from Environment Canada:
“Water is a natural resource circulating back and forth in the hydrologic cycle. However, pressures on water resources are growing in Canada. For example, between 1972 and 1996, Canada’s rate of water withdrawals increased by almost 90 percent, from 24 billion m³/yr (cubic metres per year) to 45 billion m³/yr. But, our population increased by only 33.6 percent over the same period, illustrating the growth in our thirsty lifestyles. As the readily available supplies of fresh water are being used up, we begin to see that there are real limits to how much water we can count on. We can, however, make a significant contribution to solving these problems by reducing unnecessary levels of water use. To do so requires that we identify the areas within our homes, businesses, buildings and processes where we waste water and then make appropriate changes, either in our fixtures, or in our water-using habits.”
2. Ask students to complete the student worksheet on comparing “water-efficient” versus “water-wasting” practices. Discuss with students any reasons why water should not be wasted. Students could consider future water supply, climate change, the costs of water supply, sharing a limited resource, etc.
3. Explain that one way we can use water efficiently is by creating careful, realistic garden designs that make the most of the water we use. Native plant gardens are a beautiful way to create gardens that thrive in our climate all year long and thrive with little, if any, irrigation. Show students a copy of the sample Greater Victoria Native Plant Garden design.
4. Divide students into Native Plant Garden Design teams; alternatively, students can work individually. Tell students that they are going to design a native plant garden for the school. After identifying a site at school, have students read background information on Native Plant Garden Design. (Optional) Make additional resources available to students as noted above and in additional resources.
5. After completing a Native Plant Garden Site Observation Sheet, have each student or group design a native plant garden for their selected site. Each garden design should:
 - Identify the native plant species used in the design;
 - List how any plants selected were used by First Nations (Traditional Ecological Knowledge) and their importance;
 - Identify wildlife habitat created in the design;
 - List water conservation practices used;
 - Identify any special features of the garden.
6. The garden design should be presented on a poster board or paper.



EVALUATION

Have students:

- Identify at least three water conservation techniques for outside the home and discuss any implications to their lifestyle.
- Describe the importance of native plants to First Nations and contemporary societies and explain their value.
- Design a Native Plant/ Wildlife Garden.

EXTENSIONS

1. Do a soil lab session outside on your school grounds using the Student Soil Test Work Sheet.
2. Select and grow plants for the garden. Students can further their knowledge and skills by growing some of the plants that are in their garden design using the techniques outlined in the Plant Propagation Worksheet. Sample native plant seeds may be obtained from CRD Water Services and grown in the classroom. When plants are grown to a suitable size, they may be transplanted into the school garden or taken home by students to plant in a home garden.
3. Student research different garden styles (meditation, healing, butterfly sanctuary, cuttings, or vegetable or herb).

COMMUNITY CONNECTIONS

Students can visit local native plant gardens or take a workshop on gardening with native plants – see the CRD website for dates and times.

DEMONSTRATION GARDENS:

- CRD Water Services offices at 479 Island Highway, Victoria, BC.
- Springridge Commons Demonstration Gardens at Fernwood
- Swan Lake Christmas Hill Nature Sanctuary
- Oak Bay Native Plant Garden
- Royal BC Museum
- Glendale Gardens and Woodland

NATIVE PLANT GROWERS:

The following centres specialize in propagating native plants that thrive in our climate:

- Fraser's Thimble Farms, Salt Spring Island (250) 537-5788
- Russell Nursery, North Saanich (250) 656-0384
- Natural Resource Native Plant Nursery, Duncan (250) 748-0684
- Streamside Native Plants, Courtenay (250) 338-7509
- Woodgate Native Plant Services, Duncan (250) 245-7635
- Yellow Point Propagation, Ladysmith (250) 748-2558





ADDITIONAL RESOURCES:

Go to CRD Water Services website (<http://www.crd.bc.ca/water>) for the following CRD-specific documents:

- Native Plant Resource List
- Native Plants in Moist or Wet Gardens
- Evergreen Native Plants
- Native Plant Ground Covers
- Native Plant Meadow Flowers
- Native Plants for Shady Conditions
- Native Plants for Sunny Conditions
- Native Plants for Sun-Loving Thickets-Hedgerows
- Native Plants for the Seashore
- Some Common Plants of the Garry Oak Ecosystem
- Some Native Plants for Rock Gardens
- Some Native Plants for Woodland Gardens
- Native Plants for Container Gardening

REFERENCES:

CRD Water Services – *A Homeowners Guide to Outdoor Water Use* (CRD Water Services; 479 Island Highway, Victoria, BC V9B 1H7 www.crd.bc.ca/water)

CRD Water Services – *Native Plants for the Home Garden - South Coastal British Columbia* (CRD Water Services; 479 Island Highway, Victoria, BC V9B 1H7)

District of Saanich – *Wildflowers and other native plants of Saanich Garry Oak Ecosystems*.

Pettinger, April and B. Costanzo (2002). *Native Plants in the Coastal Garden, (Revised)*. Whitecap books, North Vancouver B.C.

Household Guide to Water Efficiency. Canadian Mortgage and Housing Corp. available from CRD Water Services; 479 Island Highway, Victoria, BC V9B 1H7

Sustaining Water Supply. Environment Canada from http://www.ec.gc.ca/WATER/en/manage/effic/e_sustws.htm

Go for Green from <http://www.goforgreen.ca/gardening/index.html>

Food Plants of Coastal First Peoples. 1995. by Nancy J. Turner. Royal British Columbia Museum Handbook.

The Provincial Guide: Caring for Wildlife Habitat at Home. Naturescape British Columbia. <http://www.hctf/naturescape>

Backyard Habitat for Canada's Wildlife Guidebook. Canadian Wildlife Federation. <http://www.wildeducation.org>

Plants of Coastal British Columbia. Pojar, Jim and A. MacKinnon (eds.). 1994. Lone Pine Press.

Trees, Shrubs, and Flowers to know in British Columbia and Washington. Lyons, C.P. and B. Meriless. 1995. Lone Pine Press.

DESIGN A NATIVE PLANT GARDEN STUDENT BACKGROUND INFORMATION



SITE CONSIDERATIONS

What is the size of the site? Is it sunny or shady? What are the soil conditions? Is it level or sloped? Are there existing plants, shrubs or trees that you want to include in your design? What about wildlife – any signs of wildlife visitors? Are there wildlife species that you would like to encourage to come to your garden? Visit the site at different times of day to see how the sun and shadows move across the space. Are there other design considerations such as traffic (people or other), trails, how close the site is to a water supply, or anything else that might affect the garden? Sketch the garden outline and mark existing features in the sketch.

PLAN FOR WILDLIFE HABITAT

To create or enhance wildlife habitat in a garden, think about types of habitat, wildlife, the physical landscape, and local conditions in your area. What type of habitat will work for your garden? — is it woodland, forest edge, wildflower meadow, or pond and marsh? Wildlife habitat areas can be tidy, attractive, and blend easily into adjacent, more traditional gardens. More indigenous or native plants are favoured for habitat projects because they provide natural shelter and food for native wildlife. Plantings are closer together, pruning is less rigid, lawn area is less extensive, and ground cover mulches are left in place. Some insect damage may be evident; however, this is often considered a blessing, as leaf-eating caterpillars will become butterflies. Rather than emphasizing the cultivation of plants only, animal life is also nurtured and enjoyed in a wildlife habitat garden. (The above information was obtained from *Caring for Wildlife at Home* -Naturescape BC 2003)

There are a number of components to consider in a native plant garden design:

- Diversity
- Layering
- Edges
- Native Plant selection
- Water Efficiency.

DIVERSITY - PLAN FOR A GOOD MIX OF PLANTS

Use a variety of these types of plants to ensure a diverse garden and attract wildlife:

- Evergreen & Deciduous
- Young & Old
- Tall & Short
- Nectar Plants
- Seeds, Nuts, and Berries
- Grasses and Sedges
- Mosses and Lichens.

LAYERING – CREATE A VARIETY OF LAYERS

Plants in natural areas grow in many layers. This variation in height enhances habitat diversity.

To create layers:

- Place tallest trees at the edge of your garden, in front of these place the smaller deciduous trees, then tall shrubs, lower shrubs, and finally ground cover.
- Locate shade-tolerant shrubs and ground covers underneath taller plants.



EDGES

Edges occur where one type of wildlife habitat meets another, such as where trees and shrubs meet a meadow or stream. Edges are beneficial and support a great variety of wildlife – try to create at least two edge habitats in your garden.

NATIVE PLANTS

Native plants are uniquely adapted to both our wet winters and dry summers and have little dependence on supplemental water during dry weather. They also express the ecology of our region and portray the beauty of our indigenous plant communities. The best habitat for native wildlife includes plants that occur naturally in the region. Native plants are better adapted to local soils, temperature and rainfall. They are also better able to satisfy wildlife needs by providing the right kinds of food, shelter and nesting sites. Indigenous plants usually need less water, pruning, and other maintenance than exotic or imported plants if planted in a suitable location. While some native plant species are readily available, others may be difficult to find. Do not collect plants from the wild. Interference with wild plant populations is often harmful, and the destruction of natural habitat to create backyard habitat is hardly appropriate. (The above information was obtained from Naturescape BC 2003)

The following native food plants of the Coastal Aboriginal Peoples can be planted in the garden:

Lady Fern (*Athyrium filix-femina*)

Licorice Fern (*Polypodium glycyrrhiza*)

Nodding Onion (*Allium cernuum*)

Common Camas (*Camassia quamash*)*

Cow Parsnip (*Heracleum lanatum*)*

Oregon Grape (*Mahonia aquifolium*)

Hazelnut (*Corylus cornuta*)

Soapberry (*Shepherdia canadensis*)

***these plants can have poisonous parts or can be confused with poisonous plants – use care when planting!**

The scientific names provided in italics are useful when ordering plants from a nursery. Native plants are readily available at the annual Native Plant Sales at Swan Lake Nature Sanctuary.





NAME: _____

BLOCK: _____

**NATIVE PLANT GARDEN POSTER
ASSIGNMENT EVALUATION**

CATEGORY	4	3	2	1	Mark:
Attractiveness & Organization	Format is exceptionally attractive & information is well organized.	Format is attractive & information is well organized.	The poster has well-organized information.	Format and organization of material are confusing to the reader.	_____
Research Skills & References	Three or more reliable references are cited.	Only two references are cited.	Only one reference is cited.	References are not cited.	_____
Content: Accuracy & Quality	All facts in the poster are accurate.	99-90% of the facts in the poster are accurate.	89-80% of the facts in the poster are accurate.	Fewer than 80% of the facts in the poster are accurate.	_____
Quantity of Information	All topics are addressed in full.	One topic is incomplete or missing.	Two topics are incomplete or missing.	Three or more topics are missing.	_____



NAME:

BLOCK:

NATIVE PLANT GARDEN POSTER

ASSIGNMENT INSTRUCTIONS

Your task is to use your notes, the Internet, and the information provided below and in class to research and design a garden using native plants with the aim of using water-efficient garden design principles and creating wildlife habitat. Your goal is to present accurate information and illustrations/graphics about your chosen design. You may choose to complete this assignment in a small group or individually.

TIPS FOR GARDEN DESIGN

Content: Select plants and animals that you want to include in your garden from the material provided and your own research. Describe the garden features in a clear, concise way (both graphic and text) with information from accurate sources. Posters should:

- Identify the native plant species used in the design;
- List how any plants selected were used by First Nations (Traditional Ecological Knowledge) and their importance;
- Identify wildlife habitat created in the design;
- List water conservation practices used; and
- Identify any special features of the garden.

Make your design visually interesting and engaging.

REFERENCES: Include three or more reliable references.

FORMAT

You are required to organize your information in a poster format. This can be done by hand or on the computer if you have a suitable program on your own personal computer.

EVALUATION

Your poster will be evaluated based on these four criteria:

1. Attractiveness and Organization
2. Research Skills and References
3. Accuracy and Quality of information
4. Quantity of information.



NAME:

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WATER EFFICIENT & WATER WASTING GARDEN PRACTICES

1. List examples "water efficient" versus "water wasting" practices in and around the garden or outside your home:

WATER EFFICIENT	WATER WASTING

2. What do you know about native plants that live in your area? List as many plants as you can (use common or scientific name).



NAME:

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NATIVE PLANT GARDEN SITE OBSERVATION SHEET

SCHOOL:		DATE:
DESIGN TEAM MEMBERS:		BRIEF SITE DESCRIPTION:
SITE CONDITIONS:	TEMPERATURE:	CLOUD COVER:
	TIME OF DAY:	SUN OR SHADE?
LOCATION OF WATER SUPPLY:		SPECIAL FEATURES (INCLUDE WILDLIFE):

Draw the site here. Include site dimensions (m) and surface area (m²); orientation (where is north?); existing plants or features, and make note of any hills or slopes.



NAME:

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NATIVE PLANT GARDEN SOIL TEST

Soil is a crucial part of the garden. Different soils hold different amounts of water and nutrients. The sandier the soil, the more freely water runs through, so a sandy garden needs watering more often. A soil that is richer in clay holds water more easily. Soils must also contain sufficient amounts of organic matter and minerals to provide nutrients to garden plants. Find out what is in your garden site's soil by using this simple test. The ideal soil mixture for the average garden is 50% sand; 20% silt, 10% clay, and 10% organic matter. Try the following test to find out how much sand, silt and clay there is in your garden soil. This test takes two days. Organic matter is not measured with this test, as it can only be measured in specialized laboratories.

MATERIALS:

- 1 litre jar with lid
- 250 ml of soil (air dried)
- 1 felt-tipped marker
- 1 teaspoon (tsp) plain (low-sudsing) detergent
- Tap water (approx. 750 mls)

PROCEDURE:

1. Put all ingredients into the jar and shake the mixture hard for two minutes then let it sit for one minute. Mark the level (on the jar) of the material that has settled to the bottom of your jar. This is the sand.
2. Let the jar sit for another two hours and mark the level again. This layer is the silt.
3. Leave the last layer to settle for two days. This layer is the clay.
4. Measure the individual layers and you can calculate the particle make-up of your soil. For example, if the total height of the settled soil is 10 cm and the sand is 2 cm, the silt is 3 cm and the clay is 5 cm, your soil is 20% sand; 30% silt, and 50% clay.

BRIEF SITE DESCRIPTION OF WHERE SOIL WAS TAKEN:

DATE:

Draw your jar & label your results (% sand, % silt, % clay).



NAME:

BLOCK:

PROPAGATING PLANTS FOR YOUR NATIVE PLANT GARDEN

Propagating native plants from cuttings is not difficult. Many people get hooked on the challenge of starting a wide variety of plants from cuttings.

- Softwood cuttings - cuttings from succulent new growth, can be taken in the Spring until late Summer.
- Semi-hardwood cuttings - cuttings taken after a new growth flush, from wood that will snap when bent sharply, are usually taken in summer or early Fall.
- Hardwood cuttings - cuttings taken from growth that will not snap when bent sharply, are best taken during the Fall to Spring from dormant wood.

MATERIALS:

- small plant pots in nursery flats (nurseries may donate new or used pots)
- rooting hormone
- disposable plastic gloves
- pruners or scissors
- rooting medium
- potting soil
- clear plastic bags & twist ties.



PROCEDURE:

1. Take soft or semi-hardwood cuttings just below a leaf. Cut a length approx. 11 cm long. Don't let the cut tip dry out.
2. Strip off the lower half of leaves.
3. Dip lower tip (approx 1/2 cm) into rooting hormone, tap excess powder back into rooting hormone container.
4. Plant into a rooting medium which is half sand - half peat moss or half-and-half perlite and peat moss. The rooting medium must drain well.
5. Water regularly and keep in a warm area but out of direct sunlight to avoid drying out.
6. To increase humidity for your cuttings place container with several cuttings into a clear plastic bag and tie the bag at the top.
7. Open bag every day or two for a few minutes to the change air.
8. Keep a lookout for new growth - you can be pretty sure your cuttings have rooted once new growth is seen.
9. Carefully loosen rooting medium so as not to disturb root hairs and transplant into a new container of soil. Take care not to let roots dry out. Place in a sunnier spot.
10. Pencil-thin cuttings are generally most successful for hardwood cuttings.



11. Cut hardwood cuttings approx. 16-24 cm long with approx. 6 buds each. In order to tell the top from the bottom, cut the bottom straight across below a leaf bud and the top at an angle just above a leaf bud.
12. Dip the lower ends in rooting hormone, tap off excess.
13. Lay your leafless stick bundles down sideways in rooting medium about 6-9 cm below the surface.
14. Water.
15. Place in a refrigerator or outside where it is cool but avoid letting them freeze by covering with mulch.
16. As spring approaches dig them out and plant in open ground or in containers in indirect light.

ROOT CUTTINGS: Any plant that will grow new shoots from the roots can be started by root cuttings.

17. Select roots that are between 1/2 - 1cm thick.
18. Cut the roots into pieces 3-8 cm long.
19. Lay flat in half and half soil/sand potting mix and cover with approx 2 1/2 cm of the same. Or poke down into a pot vertically.
20. Water and wait for new plant growth, then transplant.