



Missouri Environment & Garden

A Holiday Tree from the South Pacific—by David Trinklein

Most individuals do not associate the South Pacific with scenes from Dicken’s A Christmas Carol or other observances associated with the holiday season. However, between Australia, New Caledonia and New Zealand there lies a small island about 14 square miles in an area that has given us a very attractive houseplant that can double as a living Christmas tree. As its common name implies, Norfolk Island pine is endemic to Norfolk Island and possesses arboreal traits similar to those of our native evergreens.

Norfolk Island pine carries the scientific name of *Araucaria heterophylla* and is a member of the *Araucariaceae* family. Although the plant family to which it belongs occurs only in the southern hemisphere, its close morphological similarities to members of the pine family (*Pinaceae*) caused early explorers to give it its common name.

Since Norfolk Island pine is a tropical plant, it cannot endure our winters outdoors and must be treated as an interior plant. In its native habitat, it can grow as much as five feet per year and achieve a mature height of over 200 feet. Indoors, however, its growth is much slower because of the more austere environmental conditions typical of most homes.

Its graceful, horizontal branching habit and soft green color of its needles make this plant a very

attractive candidate for decoration. Indeed, some have dubbed a well-kept specimen of Norfolk Island pine as “the ultimate interior tree.” For individuals wanting a small holiday tree, plants of several sizes are commonly available for purchase during the holiday season.

Most of these plants have been grown from seeds. Therefore, overall shape as well as spacing of branches sometimes vary between plants. Those plants with dense, more closely spaced branches develop into more attractive larger plants. However, the retention of plant form in the home greatly depends on the growing conditions.

As an interior plant, Norfolk Island pine requires goodly amounts of light. Most interior plant authorities place it in the “high light” category whose members prefer between 500 and 1000 f.c. of light. Several hours of direct sunlight daily is desirable, although bright, indirect light usually results in satisfactory plant growth.

In poor light, terminal growth may cease but branches often continue to grow. This results in a short, broad plant of lesser ornamental appeal. Also in poor light, the branch tips become weakened and tend to droop. At each node on the stem of Norfolk Island pine, five to six branches should develop as the top grows. If fewer are produced, additional light (if possible)



should be provided to encourage better growth and plant shape.

The growing medium for Norfolk Island pine should be highly organic and well-drained. Media consisting of a blend of peat moss, vermiculite and perlite work well. The growing medium should be kept continually moist but not wet for best plant performance.

If plants are not provided with adequate moisture, lower branches will droop and not maintain their horizontal form. The droop that is a result of wilting differs in location from the droop at the ends of the branches that result from inadequate light. If the plant remains dry over an extended period of time, its lower branches will turn brown and fall off.

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Conversely, excessive amounts of water can lead to plant death because of root rot. When water is required, apply sufficient amounts to allow a little excess to drain through the holes in the bottom of the container. Make sure to discard excess water after drainage has stopped.

Houseplants such as Norfolk Island pine need only modest amounts of fertilizer, especially during winter months when light is poor. Feeding about once every four weeks in winter usually is adequate. An alternative is to feed on a more regular basis with a very dilute fertilizer solution. The labels of most fertilizers formulated for interior plant use give directions for both types of feeding.

As mentioned previously, Norfolk Island pine makes an excellent living Christmas tree. If used for this purpose, avoid decorating with lights that get hot. The latter can burn tender needles and cause permanent damage. LED lighting is ideal since they remain cool when illuminated and are light in weight.

Also, avoid the use of heavy ornaments which might tend to bend the branches downward. When branches have been weighted in such a manner for an excessive period of time, they lack the ability to “spring back” to their original orientation. The end result is the symmetry of the plant will be ruined.

It is typical for garden centers and mass merchandise outlets to offer an impressive selection of Norfolk Island pines at this time of the year. Sizes ranging from compact desk or tabletop plants all the way up to floor plants that rival a traditional Christmas tree in height often can be found. Select plants that are vigorous, healthy and of good plant form.

It is not unusual for a newly purchased plant to drop a few needles when it is introduced into the home. The plant is “acclimatizing” to its new environment and lower light conditions. Needle drop should stop once the process has been completed.

Given proper care, a Norfolk Island pine purchased this holiday season can give many years of enjoyment to its owner. Repotting to a larger container usually is not necessary for three or four years, depending upon growing conditions.

Getting to the Root of Burr Knots on Apple Trees

With the beginning of the pruning season, disorders on apple tree trunks and limbs are often more apparent than when trees are in full leaf during the growing season. Burr knots are an inherited disorder that appear tumor-like, but are actually masses of small roots initials found on the aboveground portion of a rootstock or on limbs of apple trees. Dwarf trees with M.9 rootstock and semi-dwarf trees with M.7, M.26, MM 106, or MM.111 rootstocks can develop burr knots. Scion cultivars, such as Gala and Empire, can also produce burr knots on the underside of limbs.



Photo by: Emily Hoover

A burr knot is often initiated from a root primordium at a node. Shaded portion of the trees, along with high humidity and temperatures ranging from 68°F to 95°F favor the development of root initials during the year of planting. In the second growing season, root initials can rupture the epidermal surface of the tree. As the tree ages, additional roots form and a burr knot continues to increase in size.

Burr knots are problematic for several reasons. First, they create a structural weakness, causing the tree to break when loaded with a heavy crop of apples and windy conditions occur. When several burr knots coalesce, they can stunt the tree or also limit the functioning phloem, which restricts sugar transport in the affected portion of the tree. Burr knots also provide an entry for damaging insects such as dogwood and plum borers or wooly apple aphids. They also provide an infection site for fire blight bacteria and wood-rotting fungi. Root initials of burr knots are also more susceptible to low winter temperatures than adjacent tissue.

There are a few preventive measures that can be used to minimize burr knot development. At planting, place the tree in the ground so that the graft union is just above the soil surface and water the tree. Make sure that after the tree settles the graft union remains above the soil surface to prevent scion rooting. If the union becomes buried in soil and scion rooting occurs, the dwarfing effect of the rootstock is lost. During the growing season, maintain a vegetation-free area beneath the tree to increase air movement and promote rapid drying of the trunk. Also, avoid the use of tree guards that fit around the trunk as they provide shade and increase humidity, which promote burr knot growth.

When burr knots are visible, the root initials can be cut out using a knife, file, or rasp if only a few apple trees are affected. Alternatively, burr knots can be treated with naphthalene acetic acid (NAA) which is also used in the spring for apple fruit thinning and is available from orchard suppliers.

Plant Diagnostic Clinic: End of the Year Summary for Horticultural Plants

by Patricia K. Hosack

As of December 11th, 2015, the Plant Diagnostic Clinic (PDC) had 403 samples submitted. Most of the samples were submitted for disease diagnosis, though some were for insect or plant identification (Figure 1). Despite the excessive rain and cool summer temperatures, growers and homeowners still had plant health issues to deal with. The diversity of horticultural plants submitted to the clinic was vast. A complete list of diagnosed diseases, by host, can be found below (Tables 1-4). Abiotic issues, such as chemical injuries or environmental issues, were also diagnosed in all the sample categories (Figure 2).

Due to the a rain-filled spring and early summer, not surprisingly, diagnosis of *Pythium* and *Phytophthora* diseases were numerous in many hosts. Both pathogens are oomycetes, or water molds, meaning they love water and cause epidemics quickly in saturated situations. Both organisms take advantage of excess water by producing a motile spore called a zoospore, that uses flagella to swim

from root to root or plant to plant. Bacterial diseases were also commonly diagnosed in a multitude of hosts, since rain splash moves these organisms from leaf to leaf. Numerous fungal diseases were also diagnosed on evergreen ornamentals. We saw a reduction of these with the warmer, drier weather of late July - September, but observed a resurgence in late October and November.

The PDC is open year round for sample submission. The typical turn around is 48 hours, depending on the day of the week the sample is submitted. If special testing is required, such as an ELISA or culture plating, turn around time varies. A general diagnosis is \$15, additional services are \$10 each. For horticultural crops, additional services may include culture plating, serological assays (ELISA or immunotrips) or other miscellaneous molecular testing methods.

Please see the PDC website (<http://plantclinic.missouri.edu>) or call (573-882-3019) for more information.

Figure 1.

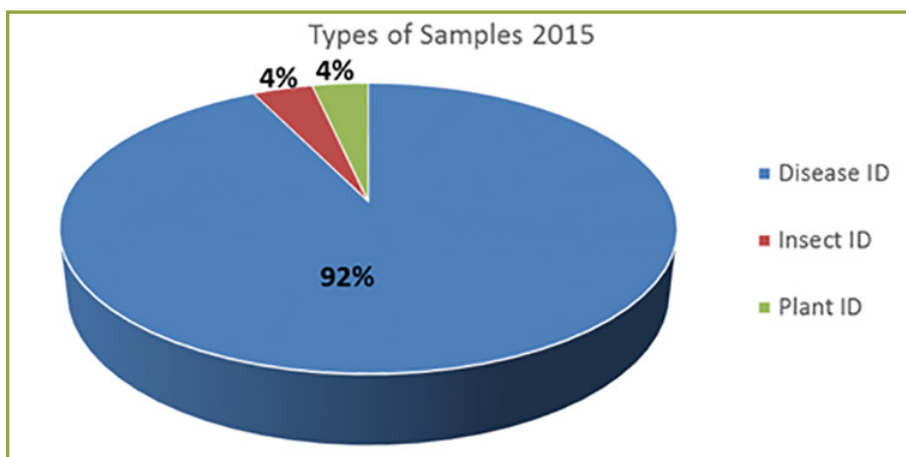
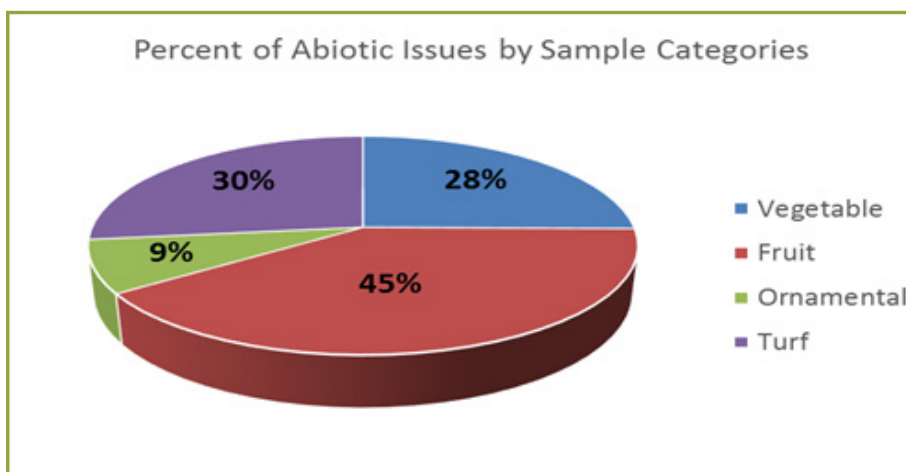


Figure 2.



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Table 1: Diagnosed Pest Issues on Vegetables

Host	Diagnosis (Causal agent): Number of confirmed samples
Bell Pepper	Alternaria Leaf Spot (<i>Alternaria</i> spp.) : 1
Bell Pepper	Bacterial Leaf Spot (<i>Xanthomonas</i> spp.) : 1
Broccoli	Black Spot (<i>Alternaria</i> spp.) : 1
Cabbage	Black Spot (<i>Alternaria</i> spp.) : 1
Cucumber	Anthrachnose (<i>Colletotrichum orbiculare</i>) : 1
Cucumber	Bacterial Soft Rot (Unidentified Bacterium) : 1
Garlic	Bacterial Soft Rot (<i>Erwinia</i> spp.) : 1
Kale	Black Spot (<i>Alternaria</i> spp.) : 1
Napa; Chinese cabbage	Black Spot (<i>Alternaria</i> spp.) : 1
Pumpkin	Fusarium Crown Rot (<i>Fusarium solani</i> f.sp. <i>cucurbitae</i>) : 1
Rhubarb	Slugs (Mollusca; Gastropoda) : 1
Tomato	Alternaria Leaf Spot (<i>Alternaria</i> spp.) : 1
Tomato	Bacterial Canker (<i>Clavibacter michiganensis michiganensis</i>) : 1
Tomato	Brown root rot (<i>Colletotrichum coccodes</i>) : 1
Tomato	Early Blight (<i>Alternaria solani</i>) : 5
Tomato	Fusarium Crown Rot (<i>Fusarium</i> spp.) : 1
Tomato	Gray Mold (<i>Botrytis cinerea</i>) : 1
Tomato	Lesion Nematodes (<i>Pratylenchus</i> spp.) : 1 * Confirmed by Nematology Lab (http://soilplantlab.missouri.edu/nematode/)
Tomato	Onion Thrips (<i>Thrips tabaci</i>) : 1
Tomato	Root-knot Nematodes (<i>Meloidogyne</i> spp.) : 2 * Confirmed by Nematology Lab (http://soilplantlab.missouri.edu/nematode/)
Tomato	Septoria Leaf Spot (<i>Septoria</i> spp.) : 2
Tomato	Southern Blight (<i>Sclerotium rolfsii</i>) : 1
Zucchini Squash	Cucurbit Bacterial Wilt (<i>Erwinia tracheiphila</i>) : 1

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Table 2: Diagnosed Pest Issues on Fruits

Host	Diagnosis: (Causal agent): Number of confirmed samples
Apple	Fire Blight (<i>Erwinia amylovora</i>) : 1
Blackberry	Spur; Cane Blight (<i>Didymella applanata</i>) : 1
Blueberry	Alternaria Leaf Spot (<i>Alternaria</i> spp.) : 1
Blueberry	Crown and Root Rot (<i>Phytophthora</i> spp.) : 1
Blueberry	Gloeosporium Leaf Spot (<i>Gloeosporium</i> spp.) : 1
Cantaloupe	Alternaria Leaf Blight (<i>Alternaria</i> spp.) : 1
Cantaloupe	Alternaria Leaf Blight and Spot (<i>Alternaria cucumerina</i>) : 1
Cantaloupe	Cucurbit Bacterial Wilt (<i>Erwinia tracheiphila</i>) : 1
Grape	Bitter Rot (<i>Greeneria uvicola</i>) : 1
Grape	Crown Gall (<i>Agrobacterium vitis</i>) : 1
Grape	Grape Downy Mildew (<i>Plasmopara viticola</i>) : 2
Grape	Grape Phylloxera (<i>Daktulosphaira vitifoliae</i>) : 1
Grape	Pierce's Disease (<i>Xylella fastidiosa</i>) : 1
Grape	Leaf Spot (<i>Pestalotia</i> spp.) : 2
Grape	Phomopsis Rachis Rot (<i>Phomopsis</i> spp.) : 1
Peach	San Jose Scale (<i>Diaspidiotus perniciosus</i>) : 1
Peach	Scab (<i>Cladosporium</i> spp.) : 1
Pear	Fire Blight (<i>Erwinia amylovora</i>) : 1
Pear	Pear Stony Pit (Pear Stony Pit Virus) : 1
Strawberry	Cylindrocarpon Crown Rot (<i>Neonectria</i> spp.) : 1
Strawberry	Powdery Mildew (<i>Podosphaera macularis</i>) : 1
Strawberry	Twospotted Spider Mite (<i>Tetranychus urticae</i>) : 2
Watermelon	Alternaria Leaf Blight or spot (<i>Alternaria</i> spp.) : 4
Watermelon	Anthracnose (<i>Colletotrichum orbiculare</i>) : 1
Watermelon	Aphids (<i>Aphis</i> spp.) : 1
Watermelon	Bacterial Fruit Blotch (<i>Acidovorax avenae citrulli</i>) : 1
Watermelon	Cercospora Leaf Spot (<i>Cercospora</i> spp.) : 2
Watermelon	Cucurbit Gummy Stem Blight (<i>Didymella bryoniae</i>) : 1
Watermelon	Fusarium Fruit Rot (<i>Fusarium</i> spp.) : 1

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Table 3: Diagnosed Pest Issues on Ornamental plants.

Host	Diagnosis: (Causal agent): Number of confirmed samples
Arborvitae	Kabatina Twig Blight (Kabatina thujae) : 1
Ash	Ash Decline Complex (Unidentified Agent) : 1
Ash	Ash Flower Gall Mite (Eriophyes fraxiniflora) : 2
Ash	Mycosphaerella Leaf Spot (Mycosphaerella spp.) : 1
Boxwood	Armored Scales (Family Diaspididae) : 1
Boxwood	Macrophoma Leaf Spot (Macrophoma candollei) : 1
Boxwood	Volutella Leaf Blight (Volutella spp.) : 1
Burning Bush	Mealybug (Family Pseudococcidae.) : 1
Eastern Red cedar	Needle Blight (Cercospora spp.) : 1
Chinese Chestnut	Wood Decay Fungus (Unidentified Fungus) : 1
Chrysanthemum	Alternaria Leaf Blight (Alternaria spp.) : 1
Chrysanthemum	Pythium Root and Crown Rot (Pythium spp.) : 1
Flowering Dogwood	Dogwood Anthracnose (Discula destructiva) : 1
American Elm	Dutch Elm Disease (Ophiostoma spp.) : 1
Elm	alcohol flux : 1
Douglas-fir	Diplodia Tip Blight (Diplodia pinea) : 1
Douglas-fir	Phomopsis Tip Blight (Phomopsis juniperovora) : 1
Geranium	Gray Mold (Botrytis cinerea) : 1
Holly	Alternaria Leaf Spot (Alternaria spp.) : 1
Holly	Armored Scales (Family Diaspididae) : 2
Holly	Canker and Dieback (Botryosphaeria dothidea) 2
English Ivy	Anthracnose (Colletotrichum spp.) : 1
Juniper	Seiridium Canker (Seiridium spp.) : 3
Juniper	Eastern Juniper Bark Beetle (Phloeosinus dentatus) : 1
Juniper	Juniper Scale (Carulaspis juniperi) : 1
Juniper	Phomopsis Tip Blight (Phomopsis juniperovora) : 1
Leyland Cypress	Seiridium Canker (Seiridium spp.) : 1
Japanese Maple	Dieback; Canker; Twig Blight (Botryosphaeria spp.) : 1
Japanese Maple	Bark Beetles (Family Scolytidae) : 1
Maple	Anthracnose (Colletotrichum spp.) : 2
Maple	Armillaria Root Rot (Armillaria spp.) : 1
Maple	Armored Scales (Family Diaspididae) : 1
Maple	Spider Mites (Family Tetranychidae) : 1
Maple	Termites (Order Isoptera) : 1
Million Bells	Pythium Root and Crown Rot (Pythium spp.) : 1

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Table 3: (continued) Diagnosed Pest Issues on Ornamental plants.

Host	Diagnosis: (Causal agent): Number of confirmed samples
Oak	Armored Scales (Family Diaspididae) : 1
Oak	Bacterial Leaf Scorch (<i>Xylella fastidiosa</i>) : 6
Oak	Bark Beetles (Family Scolytidae) : 3
Oak	Canker (<i>Hypoxylon</i> spp.) : 1
Oak	Dieback; Canker; Twig Blight (<i>Botryosphaeria</i> spp.) : 1
Oak	Horned Oak Gall Wasp (<i>Callirhytis cornigera</i>) : 2
Oak	Foliar Insect Gall (Insect Gall) : 2
Oak	Tubakia Leaf Spot (<i>Tubakia dryina</i>) : 2
Oak	Powdery Mildew (<i>Erysiphe alphitoides</i>) : 1
Oak	Oak Wilt (<i>Ceratocystis fagacearum</i>) : 3
Oak	Spider Mites (Family Tetranychidae) : 2
Phlox	Anthracnose (<i>Colletotrichum</i> spp.) : 1
Pine	Brown Spot Needle Blight (<i>Mycosphaerella dearnessii</i>) : 2
Pine	Pine Needle Scale (<i>Chionaspis pinifoliae</i>) : 1
Pine	Bark Beetles (Family Scolytidae) : 1
Privet	Armillaria Root Rot (<i>Armillaria</i> spp.) : 1
Rose	Alternaria Leaf Spot (<i>Alternaria</i> spp.) : 1
Rose	Anthracnose (<i>Colletotrichum</i> spp.) : 1
Rose	Powdery Mildew (Unidentified Fungus) : 1
Norway Spruce	Spruce Spider Mite (<i>Oligonychus ununguis</i>) : 1
Norway Spruce	Sudden Needle Drop (<i>Setomelanomma holmii</i>) : 2
Spruce	Pine Needle Scale (<i>Chionaspis pinifoliae</i>) : 1
Spruce	Rhizosphaera Needle Cast (<i>Rhizosphaera kalkhoffii</i>) : 2
Spruce	Cytospora Canker; Dieback (<i>Cytospora</i> spp.) : 1
Spruce	Phomopsis Tip Blight (<i>Phomopsis juniperovora</i>) : 1
Spruce	Soft Scales (Family Coccidae) : 1
Dwarf Alberta spruce	Adelgid (<i>Adelges</i> spp.) : 1
Supertunia	Alternaria Leaf Blight (<i>Alternaria</i> spp.) : 1
Sweetgum	Bacterial Leaf Scorch (<i>Xylella fastidiosa</i>) : 1
Viburnum	Bacterial Blight (<i>Pseudomonas syringae syringae</i>) : 1
Weeping Cherry	Dieback; Canker; Twig Blight (<i>Botryosphaeria</i> spp.) : 1
Weeping Cherry	Fire Blight (<i>Erwinia amylovora</i>) : 1
Witch Hazel	Phyllosticta Leaf Spot (<i>Phyllosticta hamamelidis</i>) : 1
Yew	Mealybugs (Family Pseudococcidae) : 1

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Table 4: Diagnosed Pest Issues on Turfgrass.

Host	Diagnosis: (Causal agent): Number of confirmed samples
Bluegrass	Brown Patch (<i>Rhizoctonia solani.</i>) : 1
Bluegrass	Summer Patch (<i>Magnaporthiopsis poae</i>) : 2
Bluegrass	Grub damage (Various scarab beetle larva): 2
Tall Fescue	Seedling Damping Off (<i>Pythium spp.</i>) : 1
Tall Fescue	Brown Patch (<i>Rhizoctonia solani.</i>) : 1
Mixed turfgrass	Slime Mold (Class Myxogastria) : 1
Mixed turfgrass	Gray Leaf Spot (<i>Pyricularia grisea</i>) : 1

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JANUARY GARDENING CALENDAR

Category	Week				Activity
	1	2	3	4	
Houseplants	x	x	x	x	To clean heavily encrusted clay pots, scrub them with a steel wool pad after they have soaked overnight in a solution consisting of one gallon water to which one cup of white vinegar has been added. After the deposits are removed rinse the pots in clear water. A brief soak in a solution of one gallon of water to which one cup household bleach has been added will help sanitize the pots.
	x	x	x	x	Some plants are sensitive to the fluorine and chlorine in tap water. Water containers should stand overnight to allow these gases to dissipate before using on plants.
	x	x	x	x	Wash the dust off of houseplant leaves on a regular basis. This allows the leaves to gather light more efficiently and will result in better growth.
	x	x	x	x	Set the pots of humidity-loving houseplants on trays filled with pebbles and water. Pots should sit on the pebbles, not in the water.
	x	x	x	x	Allow tap water to warm to room temperature before using on houseplants.
	x	x	x	x	Fluffy, white mealy bugs on houseplants are easily killed by touching them with a cotton swab soaked in rubbing alcohol.
	x	x	x	x	Insecticidal soap sprays can be safely applied to most houseplants for the control of many insect pests.
	x	x			Quarantine new gift plants to be sure they do not harbor any insect pests.
			x	x	Amaryllis aftercare: Remove spent flower after blooming. Set the plant in a bright sunny window to allow the leaves to fully develop. Keep the soil evenly moist, not soggy. Fertilize occasionally with a general purpose houseplant formulation.
Ornamentals	x	x	x	x	Gently brush off heavy snows from tree and shrub branches.
	x	x	x	x	Limbs damaged by ice or snow should be pruned off promptly to prevent bark from tearing.
	x	x	x	x	Check stored summer bulbs such as dahlias, cannas and gladioli to be sure they are not rotting or drying out.
	x	x	x	x	To reduce injury, allow ice to melt naturally from plants. Attempting to remove ice may damage plants further.
	x	x	x	x	Use sand, bird seed, sawdust or vermiculite to gain traction on icy paths. Avoid salt or ice melters as these may injure plants.
	x	x	x	x	Make an inventory of the plants in your home landscape. Note their location and past performance. Plan changes on paper now.
			x	x	Sow pansy seeds indoors now.

Gardening Calendar supplied by the staff of the William T. Kemper Center for Home Gardening located at the Missouri Botanical Garden in St. Louis, Missouri. (www.GardeningHelp.org)

JANUARY GARDENING CALENDAR

Category	Week				Activity
	1	2	3	4	
Miscellaneous	x	x	x	x	Avoid foot traffic on frozen lawns as this may injure turf grasses.
	x	x	x	x	Make a resolution to keep records of your garden this year.
	x	x	x	x	Store wood ashes in sealed, fireproof containers. Apply a dusting around lilacs, baby's breath, asters, lilies and roses in spring. Do not apply to acid-loving plants. Excess ashes may be composted.
	x	x	x	x	Check all fruit trees for evidence of rodent injury to bark. Use baits or traps where necessary.
	x	x	x	x	Cakes of suet hung in trees will attract insect-hunting woodpeckers to your garden.
	x	x	x	x	Brightly colored paints applied to the handles of tools will make them easier to locate in the garden.
	x	x			Seed and nursery catalogs arrive. While reviewing garden catalogs, look for plants with improved insect, disease and drought-tolerance.
	x	x			Old Christmas trees can be recycled outdoors as a feeding station for birds. String garlands of peanuts, popcorn, cranberries, fruits and suet through their boughs.
	x				Christmas tree boughs can be used to mulch garden perennials.
	x				If you didn't get your bulbs planted before the ground froze, plant them immediately in individual peat pots and place the pots in flats. Set them outside where it is cold and bury the bulbs under thick blankets of leaves. Transplant them into the garden any time weather permits.
		x	x	x	Try sprouting a test sample of left over seeds before ordering new seeds for spring. (Roll up 10 seeds in a damp paper towel. Keep moist and warm. Check for germination in a week. If fewer than half sprout, order fresh seed.)
				x	Swap seeds and plant information with your gardening friends.

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