

Black Walnut & Juglone

A Garden Guide

Beautiful! Majestic! Tough! *Juglans nigra* (**Black Walnut**) are large native trees grown for their wood, nuts, shade, and wildlife habitat. However, when certain other landscape plants are planted near or under this shade tree, they can yellow, wilt, and die - which initially can resemble underwatering.



This decline occurs because the walnut tree produces a non-toxic, colorless chemical called hydrojuglone. Hydrojuglone is found in leaves, stems, fruit hulls, inner bark and roots. When exposed to air or soil compounds, hydrojuglone is oxidized into the allelochemical juglone, which is highly toxic to certain plants and fungi.

Juglone is produced in walnut leaves during the growing season and then moves into the root. Juglone is released from walnut trees in several ways: leaves falling and decaying; nut husks; root leakage and decay; and rain-drip from the crown. Juglone is not soluble in water and cannot move far in the soil. **Only minute amounts** are required to poison some plants.



The most intense concentrations of Juglone are found wherever there are **roots**, and in the **nuts**. When in doubt, plant safely outside the dripline, which can be 50' from the tree. Some farmers and gardeners have reported impacts up to 80' from their Black Walnut trees.

Related trees, such as *Juglans cinerea* (Butternut), *Juglans regia* (English or Persian walnut), and *Carya* (Hickory, Pecan) also produce Juglone. Butternut is thought to produce as much Juglone as Black Walnut, the others produce it in lesser quantities. However, English or Persian walnuts are often grafted onto Black Walnut rootstock.

Below is a list of juglone-tolerant trees, shrubs, vines, ground covers, flowers, and edible plants that can grow under or in the areas that might contain walnut roots:

TOLERANT TREES AND SHRUBS

Acer spp. - (Red, Sugar, Japanese) Maple
Aesculus glabra - Ohio Buckeye
Amelanchier spp. - Serviceberry
Asimina triloba - Pawpaw
Berberis spp. - Barberry
Betula nigra - River Birch
Callicarpa americana - Beautyberry
Castanea dentata - American Chestnut
Cercis canadensis - Redbud
Chionanthus spp. - Fringetree
Corylus americana - American Hazelnut
Cornus alternifolia - Pagoda Dogwood
Cornus amomum - Silky Dogwood
Cornus florida - Flowering Dogwood
Crataegus spp. - Hawthorn
Daphne spp. - Daphne
Diosypros virginiana - Persimmon
Forsythia spp. - Forsythia
Gleditsia triacanthos - Honey locust
Halesia caroliniana - Carolina Silverbell
Hamamelis sp. - Witch Hazel
Hibiscus syriacus - Rose of Sharon
Hydrangea arborescens - Snowball
Hydrangea
Hypericum prolificum - St. John's Wort
Ilex opaca - American Holly
Juniperus spp. - Juniper

Koelreuteria paniculata - Golden Rain Tree
Lindera benzoin - Spicebush
Liquidambar styraciflua - Sweetgum
Liriodendron tulipifera - Yellow Poplar, Tulip Tree
Magnolia acuminata - Cucumber Tree
Nyssa sylvatica - Black Gum
Philadelphus spp. - Mock Orange
Physocarpus opulifolius - Ninebark
Quercus spp. - Oak
Rhododendron hybrids "Balzac" & "Gibraltar"
Rhododendron periclymenoides - Pinxterbloom Azalea
Rhus typhina - Staghorn Sumac
Rosa virginiana - Virginia Rose
Salix spp. - Willow
Sambucus canadensis - Elderberry
Sassafras albidum - Sassafras
Thuja occidentalis - Arborvitae
Tsuga canadensis - Canadian Hemlock
Ulmus americana - American Elm
Viburnum acerifolia - Maple-leaved Viburnum
Viburnum carlesii - Koreanspice Viburnum
Viburnum prunifolium - Blackhaw
Yucca spp. - Yucca

TOLERANT VINES, GROUND COVERS, AND FLOWERS

Achillea spp. - Yarrow
Ajuga spp. - Bugleweed
Alcea rosea - Hollyhock
Anemone spp. - Windflower
Arisaema triphyllum - Jack in the Pulpit
Asarum spp. - Wild Ginger

Astilbe spp. - Astilbe
Athyrium spp. - Lady Fern
Calendula officinalis - Pot Marigold
Campanula spp. - Bellflower
Chionodoxa luciliae - Glory of the Snow
Clematis spp. - Clematis

Dryopteris spp. - Wood Fern
Echinacea purpurea - Purple Coneflower
Epimedium spp. - Epimedium
Eutrochium spp. - Joe Pye Weed



Galanthus nivalis - Snowdrop
Galium odoratum - Sweet Woodruff
Gentiana spp. - Gentian
Geranium spp. - Cranesbill
Helianthus spp. - Perennial Sunflower
Helleborus spp. - Hellebore
Hemerocallis spp. - Daylily
Heuchera spp. - Heuchera
Hosta spp. - Hosta
Ipomoea spp. - Morning Glory
Iris sibirica - Siberian Iris
Lamprocapnos spectabilis - Asian bleeding heart
Leucanthemum x superbum - Shasta Daisy
Liriope spp. - Monkey Grass
Lobelia spp. - Lobelia
Mentha piperita - Peppermint
Mertensia virginica - Virginia Bluebell

Monarda spp. - Bee Balm
Muscari spp. - Grape Hyacinth
Narcissus sp. - Daffodils (some, not all types)
Oenothera spp. - Evening Primrose
Onoclea sensibilis - Sensitive Fern
Osmunda cinnamomea - Cinnamon Fern
Parthenocissus spp. - Boston Ivy
Phlox paniculata - Phlox
Physostegia spp. - Obedient Plant
Podophyllum peltatum - Mayapple
Polemonium reptans - Jacob's Ladder
Polygonatum spp. - Solomon's Seal
Polystichum spp. - Christmas Fern
Primula spp. - Primrose
Pulmonaria spp. - Lungwort
Ranunculus spp. - Buttercup
Rudbeckia spp. - Black-eyed Susan
Scilla sibirica - Siberian squill
Sedum spp. - Stonecrop
Solidago spp. - Goldenrod
Stachys byzantina - Lamb's Ears
Symphotrichum spp. - Aster
Thalictrum spp. - Meadow Rue
Tradescantia virginiana - Spiderwort
Trillium spp. - Trillium
Tulipa spp. - some but not all Tulips
Veronica spp. - Speedwell
Vernonia noveboracensis - Ironweed
Viola spp. - Violet
Wisteria spp. - Wisteria
Zinnia spp. - Zinnia

TOLERANT EDIBLE PLANTS

Allium - Chives, Garlic, Leeks, Onion
Amelanchier sp. - Serviceberry
Asimina triloba - Pawpaw
Beta vulgaris - Beet and Swiss Chard
Corylus americana - American Hazelnut
Cucurbitae - Cucumber, Melon, Pumpkin, Squash

Daucus carota subsp. *Sativus* - Carrot
Diospyros virginiana - Persimmon
Pastinaca sativa - Parsnip
Phaseolus sp. - Beans
Prunus spp. - Cherry, Peach, Plum
Sambucus canadensis - Elderberry

Zea mays - Corn

PLANTS DAMAGED BY JUGLONE

Do not plant within 50' of a Black Walnut tree.

Aronia spp. - Chokeberry

Asparagus officinalis - Asparagus

Baptisia australis - Blue False Indigo

Betula sp. - Birch

Brassicaceae spp. - Broccoli, Cabbage, Kale, Kohlrabi

Chrysanthemum sp. - Chrysanthemum

Colchicum autumnale - Autumn Crocus, Meadow Saffron

Convallaria majalis - Lily of the Valley

Hydrangea sp. - Hydrangea

Kalmia latifolia - Mountain Laurel

Malus spp. - Apple and Crabapple

Myosotis spp. - Forget-me-not

Narcissus 'John Evelyn,' 'Unsurpassable,' 'King Alfred', and 'Ice Follies' - Daffodils

Nicotiana glauca - Flowering Tobacco

Paeonia spp. - Peony



Petunia spp. - Petunia

Pinus sp. - Pine

Rheum rhabarbarum - Rhubarb

Rhododendron sp. - Azalea

Rubus spp. - Blackberry, Raspberry

Solanaceae spp. - Eggplant, Potato, Tomato

Syringa spp. - Lilac

Thymus spp. - Thyme

Vaccinium spp. - Blueberry

Viburnum plicatum tomentosum 'Mariesii' - Viburnum Mariesii

Vitis sp. - domesticated Grape

EXCITING BLACK WALNUT FACTS

- This list is compiled with the currently best known information regarding Black Walnuts and Juglone. **Local conditions may vary.**
- Juglone levels fluctuate from season to season. Adding ample organic matter and aerating the soil may help to decrease the impacts of Juglone in the soil.
- Black Walnuts have a very long history of human use. The nuts have been an important source for **food and dye**. The hardwood is gorgeous, shock-resistant, fine-grained, and easy to work. Mature Black Walnut trees are excellent at sequestering carbon.



- Black Walnut is an important **wildlife** tree. It is a major food source for rodents, birds, and deer will eat the foliage. It is a preferred tree for the Eastern Screech Owl to take up residence. Black Walnuts rely on squirrels to disperse their nuts. It is a preferred host for

Luna moths, Royal Walnut moth, Walnut Sphinx, Banded Hairstreaks, and an important food source for over 100 different butterflies and moths.

- Juglone is not currently thought to pose a risk to human health. However, if you decide to harvest the nutritious nuts from Black Walnut trees, **harvest as soon as possible**. Do not eat any nuts with decomposing hulls, as they can harbor serious pathogens (Penicillium mold on the hulls can create Penitrem A, a potent neurotoxin). Keep dogs and livestock away from decomposing hulls.



- Avoid using any Black Walnut chips or sawdust as horse bedding. **Horses** are particularly sensitive to Black Walnut.
- After a walnut tree is cut down, it can take several years for the allelopathic chemicals to dissipate or be broken down (some report up to 7 years!). Juglone is broken down by the **composting** process. It is safest to compost Black Walnut leaves, sawdust, mulch, and nuts for 12 months before applying to your garden. You can use a tomato plant as an experimental subject to test if it is ready or not.
- If you want to grow sensitive plants near a Black Walnut tree, grow them in half barrels or some other lined container or lined raised bed. Remember to thoroughly clean up nuts and leaves in the fall.

- There's no type of underground barrier you can use to restrict or keep the walnut roots back.
- Black Walnut trees do not seem to create Juglone until they are 7 years old. They can live to 130 years.

Sources: Bringing Nature Home, Butterflies and Moths of North America, Iowa State University, Lady bird Johnson Wildflower Center, Morton Arboretum, New York State's IPM Program via Cornell University, Ohio State University, Pennsylvania Cooperative Extension, Reems Creek Nursery staff experts, The Urban Forest - Future City 7, University of Maryland Cooperative Extension, USDA FEIS: Juglans nigra.

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