



# The Plant Doctor's LANDSCAPE TIPS

By David L. Roberts, Ph.D., *Senior Academic Specialist,  
College of Agriculture and Natural Resources, Michigan State University*

## UNDER THE WALNUT TREE

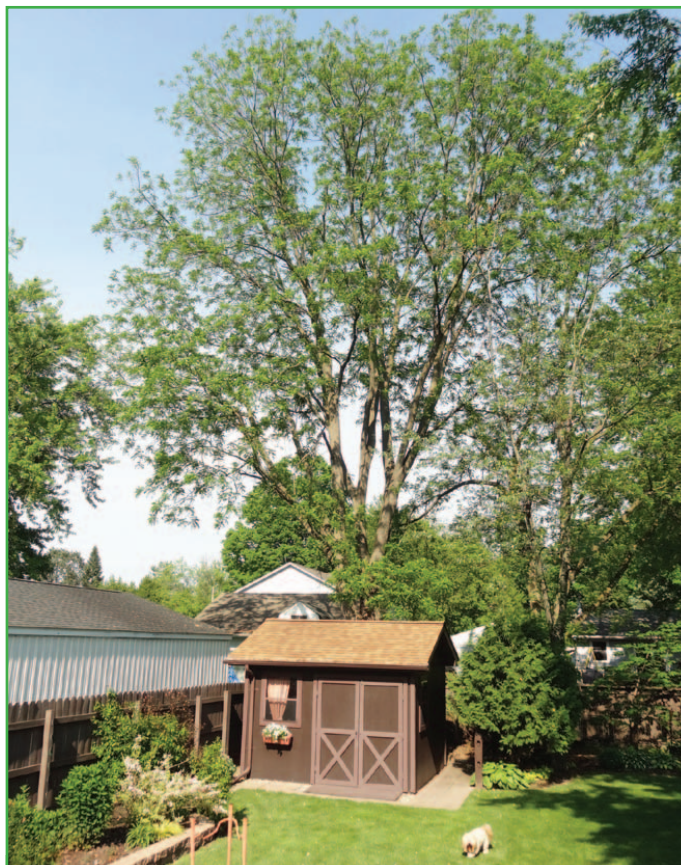
### INTRODUCTION:

Walnut is revered by wood workers and cabinet makers. Nuts are enjoyed by wild life and humans alike, provided one has the tenacity to crack the rather tough hulls. And even though walnut is among the last trees to leaf-out in the spring and among the first to lose its foliage in the fall, it is nevertheless regarded as a desirable landscape tree by many people.

Allelopathy is a scientific term used to describe the secretion of chemicals into the environment by one plant to inhibit the growth of other plants, much like a difficult neighbor who shoots off fireworks or guns or exhibits other obnoxious behavior to encourage neighbors to relocate. This phenomenon occurs more frequently than we can imagine (especially with people). For example, it is known that sugar maple, tree of heaven, hackberry, red oak, black locust, sycamore, sassafras, American elm, black cherry and cottonwood all produce chemical substances (allelochemicals) to enhance their survival by inhibiting competition from other plants. Some of the most notorious allelopathic plants belong to the genus *Juglans*.



**Photo 2:** In this close up of Photo #1, hosta and arborvitae seem to be unaffected despite their close proximity to the walnut tree and its filtered sunlight (shade).



**Photo 1:** This rather large black walnut tree covers portions of four adjoining backyards and can create serious problems for homeowners who want to have a garden or landscape. Note that several shrubs, including Weigela, flowering quince and Ninebark (left side) seem to be doing fine in the vicinity of this walnut tree.

Black walnut (*Juglans nigra*) and Butternut (*Juglans cinerea*) are the primary culprits. Persian walnuts (Carpathian and English) may also produce allelopathic effects, especially if they were grafted onto black walnut rootstocks.

*Juglans* species produce a quinone compound (5-hydroxy-alpha-naphthaquinone) commonly known as juglone, which is found in all plant parts (roots, branches, foliage and nuts). Incidentally, Hickory (*Carya* spp.) is also known to produce juglone but not to the extent that *Juglans* spp. do. Plants such as tomato, potato, pepper, blackberry, blueberry, azalea, mountain laurel, rhododendron, red pine and apple are very sensitive and can die

*Continued on page 12*



## The Plant Doctor's LANDSCAPE TIPS

### UNDER THE WALNUT TREE

Continued from page 11

within several weeks of planting within the vicinity of walnut trees. Tomato in particular is so sensitive that it undergoes "walnut wilt," in which the stem tissues turn brown and the entire plant wilts and dies. Tomato is a good "indicator plant" of juglone in the soil. Plants may also exhibit juglone-induced wilt symptoms that may be confused with root rot or drought. Root rot or drought factors can be confirmed or denied with appropriate diagnostic and/or corrective measures. Other symptoms of walnut toxicity may range from chlorosis (yellowing), slow, unthrifty growth to decline and death. As a side note, walnut trees may also be toxic to humans and animals. Many people have allergies to walnut pollen, and horses are especially vulnerable to walnut sawdust and wood chips, which are sometimes used as bedding.

#### WALNUT SENSITIVE AND TOLERANT PLANTS:

When diagnosing problems with plants, the possibility of walnut toxicity is often overlooked. Roots of walnut trees can extend well beyond their canopies, and hence, juglone may affect plants

TABLE 1: SOME WALNUT SENSITIVE PLANTS

Silver Maple (*Acer saccharinum*)  
European Alder (*Alnus glutinosa*)  
White Birches (*Betula* species)  
Northern Hackberry (*Celtis occidentalis*)  
Apples and Crabapples (*Malus* species)  
Pear (*Pyrus* sp)  
Black Alder (*Alnus glutinosa*)  
Norway Spruce, (*Picea abies*)  
Mugo Pine (*Pinus mugo*)  
Red Pine (*Pinus resinosa*)  
Eastern White Pine (*Pinus strobus*)  
Scotch Pine (*Pinus sylvestris*)  
Basswood (*Tilia heterophylla*)  
Azalea (some)  
Blackberry (*Rubus*)  
Blueberry (*Vaccinium*)  
Basswood (*Tillia*)  
Yew (*Taxus*)  
Viburnum (few)  
Saucer Magnolia (*Magnolia* × *soulangiana*)  
Potentilla (*Potentilla fruticosa*)  
Privet (*Ligustrum* spp)  
Rhododendron (Some)  
Mountain Laurel (*Kalmia latifolia*)  
Ornamental Cherries (*Prunus* spp)  
Chokeberry (*Aronia* spp)  
Lilac (? *Syringa* spp)  
Wild Columbine (*Aquilegia Canadensis*)  
*Hydrangea* species  
Lilies, *Lilium* species (especially Asian types)  
Alfalfa (*Medicago sativa*)  
Buttercup (*Narcissus*, some)  
Rhubarb (*Rheum rhabarbarum*)  
Peony (some)  
Asparagus (*Asparagus officinalis*)

TABLE 2: WALNUT TOLERANT TREES

Japanese Maple (*Acer palmatum*)  
Most Maples (*Acer* spp.)  
Catalpa (*Catalpa bignonioides*)  
Canadian Hemlock (*Tsuga canadensis*)  
Arborvitae (*Thuja occidentalis*)  
Eastern Redbud (*Cercis canadensis*)  
Eastern Red Cedar (*Juniperus virginiana*)  
Ohio Buckeye (*Aesculus glabra*)  
Goldenraintree (*Koelreuteria paniculata*)  
Serviceberry (*Amelanchier*)  
Sweetgum (*Liquidambar styraciflua*)  
Pawpaw (*Asimina triloba*)  
Tulip Poplar (*Liriodendron tulipifera*)  
River Birch (*Betula nigra*)  
Black Gum (*Nyssa sylvatica*)  
Hickory (*Carya* spp)  
Sycamore (*Platanus occidentalis*)  
Eastern Redbud (*Cercis canadensis*)  
Black Cherry (*Prunus serotina*)  
Fringetree (*Chionanthus* spp.)  
Callery Pear (*Pyrus calleryana*)  
Flowering Dogwood (*Cornus* sp.)  
Oak species (*Quercus* spp)  
Hawthorne (*Crataegus* spp)  
Black Locust (*Robinia pseudoacacia*)  
Sassafras (*Sassafras albidum*)  
American Beech (*Fagus grandifolia*)  
Ash (*Fraxinus* spp)  
Honeylocust (*Gleditsia triacanthos*)  
American Elm & others (*Ulmus americana*)  
Carolina Silverbell (*Halesia tetraptera*)  
Stone Fruits (*Prunus*: Nectarine, Cherry, Apricot, Peach)



**Photo 3:** Tomatoes and other solanaceous plants tend to be extremely sensitive to juglone, the toxic chemical secreted by black walnut. These patio tomatoes are one way of avoiding walnut toxicity in soil.



**Photo 4:** This lilac (upper right), growing within the root zone of a walnut tree, seems unaffected as do a variety of annual and perennials.

**TABLE 3: WALNUT TOLERANT SHRUBS**

Weigela (some)  
 Autumn Olive (*Elaeagnus umbellata*)  
 Barberry (*Berberis spp*)  
 Hazelnut (*Corylus americana*)  
 Forsythia (*Forsythia spp*)  
 Witchhazel (*Hamamelis spp*)  
 Snowball Hydrangea (*Hydrangea arborescens*)  
 St. Johnswort (*Hypericum prolificum*)  
 American Holly (*Ilex opaca*)  
 Juniper (*Juniperus spp*)  
 Spicebush (*Lindera benzoin*)  
 Mockorange (*Philadelphus spp*)  
 Azalea (various)  
 Sumac (*Rhus spp.* various)  
 Current (*Ribes spp*)  
 Black Raspberry (*Rubus occidentalis*)  
 Elderberry (*Sambucus canadensis*)  
 Forsythia sp.  
 Rose of Sharon (*Hibiscus sp.*)  
 Honeysuckle (*Lonicera spp.*)  
 Rhododendron (various)  
 Daphne (*Daphne spp*)  
 Lilac (*Syringa*)  
 Quince (*Cydonia*)  
 Maple-leaved Viburnum (*Viburnum acerifolia*)  
 Viburnum (most)  
 Staghorn Sumac (*Rhus typhina*)  
 Grasses (most)

**TABLE 4: WALNUT TOLERANT VINES**


Clematis (various)  
 Virginia Creeper (*Parthenocissus*)  
 Grape (*Vitis spp*)  
 Wisteria (*Wisteria spp.*)  
 Poison Ivy (yes! *Toxicodendron radicans*)  
 Euonymus

**TABLE 5: WALNUT TOLERANT HERBACEOUS ANNUALS AND PERENNIALS (SHORT LIST)**

*Astilbe*  
*Iris spp*  
*Pachysandra spp*  
 European Wild Ginger (*Asarum europaeum*)  
 Shasta Daisy (*Leucanthemum x superbum*)  
 Begonias (*Begonia spp*)  
 Marigold (*Calendula officinalis*)  
 Sweet Woodruff (*Galium odoratum*)  
 Bellflower (*Campanula latifolia*)  
 Yarrow (*Achillea spp*)  
 Narcissus (some)  
 Hosta (*Hosta spp*)  
 Bugleweed (*Ajuga reptans*)  
 Hollyhock (*Alcea rosea*)  
 St. John's Wort (*Hypericum spp*)  
 Anemone  
 Morning Glory (*Ipomoea spp*)  
 Jack-in-the-Pulpit (*Arisaema triphyllum*)  
 Grape Hyacinth (*Muscari botryoides*)  
 Daffodil (*Narcissus spp*)  
*Chrysanthemum* (many)  
 Spring Beauty (*Claytonia virginica*)  
 Crocus spp  
 Phlox (*Phlox paniculata*)  
 Dutchman's Breeches (*Dicentra cucullaria*)  
 Mayapple (*Podophyllum peltatum*)  
 Bleeding Heart (*Dicentra spp*)  
 Jacob's Ladder (*Polemonium reptans*)  
 Solomon's Seal (*Polygonatum commutatum*)  
 Purple Coneflower (*Echinacea purpurea*)  
*Aster spp*  
*Astilbe spp*  
*Peony* (most)  
*Lobelia*  
 Ferns (various)  
 Primrose (*Primula spp*)  
*Epimedium spp*  
 Bloodroot (*Sanguinaria canadensis*)  
 Dog's Tooth Violet (*Erythronium spp*)  
 Snowdrop (*Galanthus nivalis*)  
 Stonecrop (*Sedum spp.*)  
 Lamb's Ear (*Stachys byzantia*)  
*Gentian spp*  
 Cranesbill Geranium (*Geranium sanguineum*)  
 Spiderwort (*Tradescantia virginiana*)  
 Sunflower (*Helianthus spp*)  
 Jerusalem Artichoke (*Helianthus spp*)  
*Trillium spp*  
 Globeflower (*Trollius spp*)  
 Common Daylily (*Hemerocallis spp*)  
 Tulips (*Tulipa spp*)  
 Coral Bells (*Heuchera spp*)  
 Pansy and Violet (*Viola spp*)  
*Zinnia spp*  
 Wild Ginger (*Alpinia spp, Asarum spp.* Etc.)

directly under or in the vicinity of walnut trees or at some distance from the shade cover of the walnut tree. Following are several tables with lists of plants that have been observed to be sensitive and tolerant of the walnut secretion known as juglone. Please note that these are not complete lists and that there is some variation among species, cultivars and varieties of plants in relationship to their sensitivity or tolerance to juglone. Also please note that there are some discrepancies in the literature. For example, I have personally witnessed silver maple and lilac growing within the drip line of black walnut trees without ill effects ... yet the literature lists both of these species as "sensitive." So, you may see some plants listed as both sensitive and tolerant.

## AMELIORATING WALNUT TOXICITY:

There are several options for dealing with walnut toxicity. Of course, the most obvious is to remove those afflicting walnut trees; for some people, this is not an option. Another solution is to simply plant juglone-tolerant plants under or in the vicinity of walnut trees. Some people who have gardens or landscape beds near walnut trees have root-pruned their walnut trees near the border of the bed or garden. Trenching to 2-3 feet deep (repeat every several years) kills the walnut roots, and juglone is no longer secreted in that vicinity. Juglone typically degrades and dissipates naturally within a few weeks. Yet another option is to design raised beds with liners. Composting walnut leaves, nuts and wood chips also causes a degradation of juglone into non-toxic components; generally, walnut plant products are safe even for the most sensitive plants after six months of composting. 

For more information, please feel free to email David Roberts at [robertsd@msu.edu](mailto:robertsd@msu.edu) or contact a professional plant health care provider. The author, MSU and MGIA do not endorse any particular products. If using pesticides, be sure to read and follow label directions.

**Development of Landscape  
 Tips was sponsored by  
 MSU and MGIA.**



**MICHIGAN GREEN  
 INDUSTRY ASSOCIATION**

**MICHIGAN STATE  
 UNIVERSITY**