

Urban Forest Management, Inc.

July 2, 2012

Mr. Robert Kosin Village Administrator Village of Barrington Hills 112 Algonquin Road Barrington Hills, IL 60010-5199

RE: Village Hall Ash Trees

Dear Bob:

As requested, I have reviewed the ash trees on the Village Hall site. The following comments summarize this review:

1. There a total of 12 ash trees on the site, including the Fire Station. The individual tree locations are shown on the attached copy of the landscape plan by number. Two of the trees are infested with Emerald Ash Borer (EAB).

Tree No.	Species	Est. D.B.H.	Cond.	Form	Comments
1	white ash	7"	5	5	EAB
2	green ash	7"	3	4	double leader
3	green ash	6"	3	3	
4	green ash	7"	3	4	double leader
5	white ash	7"	3	3	
6	white ash	9"	3	3	
7	white ash	8"	3	3	
8	white ash	8"	3	3	
9	white ash	9"	3	4	triple leader
10	green ash	12"	5	3	EAB
11	green ash	8"	3	3	
12	green ash	7"	3	3	

2. Do we know which of these trees have been treated in the past?

Please call if you have any further questions.

Sincerely, KIRBAN FOREST MANAGEMENT, INC. Charles A. Stewart Vice President Encl.

FAX 847-516-9716

January 28, 2013

Mr. Robert Kosin Village Administrator Village of Barrington Hills 112 Algonquin Road Barrington Hills, IL 60010-5199

RE: Village Hall Landscape Plan & Tree Replacement

Dear Bob:

After our conversation regarding the Village Hall Landscape Plan and the potential loss of the existing ash trees, I thought that it would be helpful to outline a strategy for the for the long term management of the landscape. The management strategy should consider the historic landscape of the community, the hardiness of the plants, species diversity, and the maintenance needs of the plants.

The publication "Keepers of the Land" by The Garden Club of Barrington provides an insight into the flora and fauna of the historic landscape of the community. It is clear that the plants native to the region should provide the infrastructure for the Village Hall Landscape. A canopy of selected native tree species will adapt to a changing climate, provide for species diversity, require less maintenance over time, and have a longevity not found in many non-native species and some native species.

The current Village Hall landscape is based on a plan that was developed many years ago. Native species dominate the plan. Since the plan was developed, some of the selected species (elm and ash) have encountered serious insect and disease problems. The replacement of large canopy tree species should focus on the use of oak, hickory, hackberry, sugar maple, red maple, Kentucky coffee tree, and northern catalpa. The replacement of understory and ornamental trees should focus on redbud, serviceberry, ironwood, and pagoda dogwood. Other native and non native species can certainly be added to the landscape for interest such as color, habitat, or form. Species such as hawthorn, crabapple, northern white cedar, white pine, white fir, or Douglas fir are good examples.

Sincerely, URBAN FOREST MANAGEMENT, INC.

Charles A. Stewart Vice President

CITIZENS FOR CONSERVATION'S FALL 2013 NATIVE TREE AND SHRUB SALE ORDER FORM

Autumn is an ideal time to plant trees. Cool weather allows trees to establish roots in their new location before spring rains and summer heat stimulate new top growth. Some plants are marked "deer-resistant." Deer will eat almost any plant when they are hungry; however, these plants are less likely to be damaged by deer.

If you have questions about the trees & shrubs listed or you are looking for a native not shown on this order form, call us at 847-382-SAVE. We're happy to help and may be able to special order for you. All profits from this sale will be used to help us fulfill our mission, "Saving living space for living things through protection, restoration & stewardship of land, conservation of natural resources. & education."

NATIVE SHRUBS

There is a shrub for every niche, habitat and planting scenario. If you have a place, there is a shrub for it. Shrubs provide valuable habitat, have long bloom times, beautiful fall colors, and add winter interest. They are available in a wide variety of sizes. Unless marked differently, all shrubs are sold in lightweight five-gallon containers that encourage numerous roots but inhibit circling roots. No chemicals are used to enhance the fibrous root system. While these shrubs may be somewhat smaller than one typically finds at nurseries, it is the root system below ground that provides the plant its strength to flourish. Great tops and an even better root system. If you return the containers, we'll recycle them.

<u>Aesculus parviflora BOTTLEBRUSH BUCKEYE</u> A slow growing, large shrub that blooms on the 4^{th} of July. Its large candles of white blooms can really be a showstopper. A wide variety of interesting pollinators visit this plant both day and night. Requires moist, well-drained soil in partial shade though it will do OK in more sun if protected from the west. The fruit are borne in early fall and are slightly smaller than other buckeyes. Native to the US but not locally. Grows 8-12"h 8-15'w	@ \$58.
<u>Aronia melanocarpa</u> <u>BLACK CHOKEBERRY</u> Primary soil is wet swamp, but will do great in good garden soil. Small white flowers in the spring; dark purple berries in the fall. Intense red autumn color. Does best in full sun to 1/2 day sun. Possibly the birds least favorite berry. Grows 6' h 4'w	@ \$36
<u>Ceanothus americanus NEW JERSEY TEA</u> Low-growing, compact woody prairie plant. Spectacular white flowers bloom on the 4 th of July. Hummingbirds attracted to the tiny insects that pollinate its flowers. Very hardy shrub with glossy leaves. Full sun to light shade. Grows 2'h 2'w	@ \$36
<u>Cephalanthus occidentalis BUTTONBUSH</u> A shrub of the marsh or floodplain, this plant grows well in good garden soil. Leaves are an eye-catching glossy green, but lack fall color. Fragrant, showy, white golf ball-shaped flowerheads bloom in July/Aug. Offers exceptional wildlife benefits and is an effective shoreline stabilizer. Full sun. Grows 8-12'h & w	@ \$36
<u>Cornus stolonifera RED OSIER DOGWOOD</u> Upright, loose, multi-stemmed shrub with clusters of white flowers in late spring followed by white fruit. Maroon fall color. Green stems turn deep red in the fall adding interest to the winter landscape. Maintain the red stems by pruning the shrub to the ground in very early spring ever 3-4 years. Full sun to partial shade, requires wet or medium soils. Good along shorelines or in rain gardens. Grows 6-8'h & w	@ \$36
<u>Corylus americana</u> AMERICAN FILBERT Flowers are intriguing catkins that elongate in the spring & release puffs of pollen. Tasty, edible nuts provide a valuable food source. Coppery-red fall color. Best to plant 3 shrubs to achieve seed. Full sun to partial shade, no damp or clay soils. Grows 8-10' h & w	@ 36
<u>Hamamelis virginiana</u> COMMON WITCH HAZEL There's nothing common about this shrub. Spicy fragrant yellow flowers provide the last floral display of the year. Usually found along woodland edges, it requires a fine, moist, well-drained soil, and light shade. Deer resistant. Good buckthorn replacement. Also makes a good specimen shrub. Grows to almost tree size, 10-15'h &w	@ 40
<u>Hydrangea arborescens</u> SMOOTH HYDRANGEA Massive white corymbs bloom in June & July. Good shade-tolerant plant. Flowers make lovely dried arrangements. Requires watering during dry weather. Best if cut to the ground in spring. Native to the US but not locally. Grows 3-5' h 3-5' w	@ \$36

<u>Hydrangea quercifolia OAK LEAF HYDRANGEA</u> Actually native to southeastern U.S., but will do OK if protected from winter winds. Prefers 3-4 hours of morning sun. Outstanding white flowers in June & July. Leaves are oak-like in appearance & turn orange/red in fall. Grows 6'h 4'w	@\$36
<u>Hypericum kalmianum KALM'S ST. JOHN'S WORT</u> A compact, easy to grow shrub found on dunes and rocky lakeshores. Beautiful yellow flowers with a showy tuft of yellow stamens bloom in summer. Does well in heavy clay soil as long as it is in full sun. Best used in masses. Grows 30" h & w	@ \$36
<u>Lindera benzoin SPICEBUSH</u> Shade-tolerant shrub found in mesic woods. Fragrant tiny yellow flowers in clusters along the stem bloom in very early spring before the plant leaves out. Leaves and stems have a very aromatic lemon fragrance when crushed. Fall color is clear yellow with beautiful scarlet fruit. Important larval host plant. Good replacement for buckthorn. Grows 6-12'h & w	@ \$36
<u>Physocarpus opulifolius</u> NINEBARK Pinkish to white umbel-like clusters bloom in June. Exfoliating bark exposes a cinnamon brown inner bark adding winter interest. A large durable shrub that tolerates a wide range of soil conditions, but does best in dry to medium-wet soil. Full to 1/2-day sun. Grows 8-10'h & w	@ \$36
<u><i>Rhus aromatica</i></u> FRAGRANT SUMAC Does best in full sun and dry sites, but is adaptable to light shade. Fall color is an orange-red. Good plant to place in front of taller shrubs because of its horizontal layering effect. Fruit provides winter food for birds. Grows 5-8' h 4-6'w	@ \$36
<i>Rhus typhina</i> STAGHORN SUMAC The common name "staghorn" is derived from the pubescence (hair) on the stems that look like a buck's antler. Requires full sun to partial shade and soil with good drainage. Very showy rich gold to orange & ember red fall color. Fast growing and suckers rather vigorously. Grows 20'h 6-12'w	@ \$36
<u>Rosa setigera</u> <u>ILLINOIS ROSE</u> Prefers woodland edges where it gets ¹ / ₂ -day sun. Pink flowers with yellow centers bloom in July. Fall color is red orange with red rose hips. May be used as a climbing rose. Hardy. Renewal pruning can be done every 3 years in the spring since it blooms on new wood. Grows 5-6'h 6-8'w _	@ \$36
<u>Sambucus canadensis ELDERBERRY</u> Showy, ornamental accent shrub arching in form. Small flowers mass together in 6-12" wide cymes in June. Purple-black fruit from Aug to Sept is quickly devoured by birds or makes tasty jams and jellies. Great plant for a shrub border that has half-day sun and moist to wet soil. Grows 8-10'h 6-8'w	@ \$36
<u>Spiraea alba MEADOWSWEET</u> Delicate white cone-shaped flower clusters bloom in June. A dense shrub with burnt orange to burgundy fall color. Does well in good garden soil in full sun to partial shade. Grows 2-4' h & w	@ \$36
<u>Viburnum dentatum</u> ARROW WOOD White flowers in early summer followed by dark blue berries devoured by birds in the fall. Distinctive toothed leaf provides beautiful autumn colors. Full sun to ¹ / ₂ day sun in good garden soil. Grows 8-10'h 5-8'w	@ \$36
<u>Viburnum lentago</u> NANNYBERRY Glossy green foliage provides fabulous maroon red fall colors. Creamy-white flowers in May and attractive blue-black fruit that birds love in the fall. Vase-shaped shrub that grows 15'h 8-12'w. Full sun to ½ day sun. Adaptable to all soil types.	@ \$36
<u>Viburnum prunifolium BLACKHAW VIBURNUM</u> A dense, twiggy shrub that blooms with white flowers in May, followed by dark rose fruit that changes to blue-black in the fall. A bird favorite. One of the most shade and drought tolerant viburnums. Branches are perpendicular to the stem providing nice year-round privacy screening. Good replacement for buckthorn. Grows 15'h 8-12'w	@ \$36
<u>Viburnum trilobum AMERICAN CRANBERRY</u> White flowers in late May, scarlet-red fruit. Birds eat the fruit in late winter, if at all. Does well in good garden soil with full sun to light shade, but is not drought-tolerant. Grows 8-10'h 6-8'w	@ \$36

NATIVE TREES

Our best advice is to choose a tree that matches the site. There is a large selection, and a tree for every niche. Trees look best when clustered in small odd-numbered groups or planted in larger borders. Don't be afraid to mix species! All trees should be mulched to help retain moisture and eliminate grass. (The cheaper stuff is the best, no cypress or dyed stuff please.)

Help maintain the character of Barrington by planting an oak. Contrary to popular belief, growth rates of oaks are far from slow, ranging from 18"– 36" per year. They are very tough trees, some live for centuries. Many are drought tolerant once established. Their value as wildlife habitat cannot be overstated.

Small-sized trees (approximately 24"-36") are available in 5-gallon containers. Larger trees are grown in root bags and are measured by the trunk caliper. (approximate sizes: 1.5" caliper = 6' height, 1.75" = 7') Root bags significantly increase survival compared to the normal balled-in-burlap method. Please remember to *remove the root bag before planting!* Some trees are available in larger sizes; call if you're interested.

Acer saccharum SUGAR MAPLE Known for its outstanding yellow & orange fall color. Does be	st in shade			
with good, well-drained, moist garden soil. Bark is dark & deeply textured. Grows 50-75'h 35-55'	'w 5-Gal	@ \$40		
	15-Gal	@ \$97		
<u>Aesculus glabra OHIO BUCKEYE</u> First tree to leaf out in spring & most shade tolerant. The 1" diameter howy fruit is called a buckeye due to its resemblance to a deer's eye. Does best in good garden soil with				
plenty of moisture. Good understory tree. Attracts hummingbirds. Grows 20-30'h 20-30'w	1.25"	@ \$155		
	5-Gal	@ \$48		
<u>Asimina triloba</u> PAWPAW Has a tropical appearance even though it is a native understory tree. Dark green leaves are up to a foot long & turn clear yellow in the fall. In early spring 3-part deep purple flowers hang like velvety bells. In order to bear fruit, more than one is needed for cross-pollination				
and good nutriset. Deer resistant. I finally nost plant for butternies. Grows 15/26/ if 16/15/w	15 Gal	@ \$112		
	13-0ai	@ \$112		
<u>Betula nigra RIVER BIRCH</u> Outstanding cinnamon to brown exfoliating bark, fall yellow color, a expanding spring catkins. Fast-growing tree requires full sun and wet to moist soil. Cannot tolerate soil. Good to plant near a downspout. Grows 30-40'h 20-30' w	and dry 6'	@ \$145		
<u>Carpinus caroliniana BLUE BEECH OR HORNBEAM</u> Finely textured, graceful understory tree smooth, gray-fluted bark and red, yellow, and orange fall color. Highly adaptable. Full to half-day Nice shade tree for small yards. Clean ornamental with no off-season. Grows 14-20'h 10-15'w	with sun. 4'	@ \$150		
<u>Catalpa speciosa</u> CATALPA Very fast-growing and adaptable, this tree puts on one fantastic flow in late May. Spectacular 2" trumpet-shaped white flowers form clusters. Seedpods follow the flower frequently remain attached throughout the winter. Open, irregular tree with large heart-shaped leave Full sun. Makes an impressive visual statement. Does produce litter. Grows 40-50h 30-40'w	ver show ers & es. 1.5"	@ \$115		
<u>Celtis occidentalis HACKBERRY</u> Looks similar to an elm in form and foliage. Very adaptable; g in wet and dry soils in full sun. Good street tree. Birds relish the purplish black fruit. Rate of growt	rows h is fast			
in youth and moderate as it ages. Distinctive grooved and warty bark. Grows 50-60'h 40-50'w	1"	@ \$110		
<u>Chionanthus virginicus</u> FRINGE TREE A small ornamental tree that requires full sun or partial shade, good garden soil, and some protection from the west. Fragrant cloud-like flowers in late spring, yellow				
fall color. Native to Eastern USA. Grows 10-15'h 10'w	3'	@ \$130		
	5-Gal	@ \$56		
<u>Cornus alternifolia PAGODA DOGWOOD</u> Pagodas like a few hours of sun, moist soil, and protection from the west. Beautiful horizontal branching gives a stepped appearance, like the roof of a pagoda. White flowers in the spring, and blue-black fruit in August the birds love. Maroon-red fall color.				
Grows fast to 15'h 10-15'w	15-Gal	@ \$112		
	5-Gal	@ \$39		

Gymnocladus dioica KENTUCKY COFFEE TREE Has the largest bipinnate leaves in northern l	L &	
large leaves require large branches for support. A 2" caliper tree has only 1-3 branches, but this un	gainly	
young tree will become vigorous and well-formed. Scaly, ridged bark and irregular coarse branchi	ng	
create a dramatic effect in the winter landscape. Even fully developed it casts a light shade.		
Grows 40-60'h 30-50'w Full sun.	1.25"_	@ \$125
	5-Gal	@ \$36
Juglans cinerea BUTTERNUT OR WHITE WALNUT Often found on moist sites in the wild, the	his tree	
prefers good garden soil and full sun to light shade. Enjoy its tasty nuts in late summer or early		
fall, if you can beat the squirrels to them. Known for its valuable hardwood lumber, it makes a ve	ery nice	0.0140
shade tree. Fall color is a pretty yellow. Grows 40-50'h 30-40'w	1.25″ _	@ \$140
	5-Gal	@ \$36
Never school of DLACK CUM OD SOUD CUM Leaves an anarth many and alaren Known fo		
<u>INVSSA Sylvanica BLACK GUM OK SOUR GUM</u> Leaves are smooth, waxy and glossy. Known to	or its	
intense orange to red fail colors. Beautiful slivery bark is attractive in winter. Full sun, good soil, g	grows	@ \$110
no further south than Cook County. Protect from west winds. Grows 50-40 fr 25-55 w	13-Gal	@ \$112
	3-Gal _	@ \$40
<u>Ostrya virginiana</u> IRONWOOD A superb low-branched upland understory trees. Yellow fall col- with leaves which persist through winter. Planted in clusters, they make an effective privacy screet. Fruit looks like hops; pale green tightly bunched clusters of papery capsules each holding a small a An excellent addition to any landscape. Adapts to sun or shade conditions. Grows 20-30'h & w	or n. nut. 5-Gal	@ \$150 @ \$36
<u>Pinus strobus</u> WHITE PINE The evergreen needles are flexible, friendly to touch & fragrant all	ear long.	
This tree is site specific; it requires good, well-drained garden soil and protection from the west with	ind.	G #100
Very picturesque in the winter. Grows 50-70 h 40-50 w	4	@ \$120
<u>Populous tremuloides QUAKING ASPEN</u> A stender and graceful tree with a smooth, cream-col The round leaves hang from flexible, flattened petioles and tremble with the slightest breeze. Beau golden yellow fall color. Does best in full sun. In a naturalized setting, it grows very fast & sucker Aspens host an amazing array of birds, mammals and butterflies, but deer (bucks) like to rub their on the stems. Grows 30-40'h 15-25'w	ored bark. htiful rs freely. antlers 7' _ 5-Gal	@ \$145 @ \$36
Quarcus alba WHITE OAK II state tree Only white oak with russet-red fall color Grows in sa	od	@ \$30:
$\frac{1}{2}$ clay but not wet sites Requires at least 3.4 hours of sun Perhaps the flagship species of white	naks	
A tree for all seasons and a superior shade tree Grows 50-80'h 50-80'w	1 25"	@ \$160
A free for an seasons, and a superior shade free. Grows 50-60 if 50-60 w	1.23	@ \$100 @ \$40
	5 Our _	C \$ 10
<u>Quercus bicolor</u> SWAMP WHITE OR BICOLOR OAK Probably the oak most tolerant of wet at Bicolor oak has a symmetrical, rounded head in youth. Fall color is vellow to brown. Prefers full s	eas. un.	
A close mimic to the bur oak, it adapts to various site conditions. Grows 50-80'h 50-80'w	1.25"	@ \$145.
	5-Gal	@ \$40.
<u>Quercus ellipsoidalis HILL'S OAK</u> Also called Scarlet Oak. Grows in sandy & heavy clay soils. scarlet fall color. Good street tree. Full sun. Brown leaves stay on all winter making it a useful priv	Great /acy	
screen. Smallest of the oaks, grows 40-50'h, 40-50'w.	1.25" _	@ \$145
	5-Gal _	@ \$40
<u>Quercus imbricaria</u> SHINGLE OAK Uncommon oak found in a wide variety of soils: gravel, sand, heav clay. Requires full sun. Shingle oak leaves have no lobes or teeth. Fall color can be red-orange but more often is brown. Because the leaves are persistent until March, shingle oak is often used in place of		@\$145
CV01g10015 as a servell. 1 ull sull. 010WS 40-30 ll 40-30 W	1.2.3 5_Gal	
	J-0al	@ \$ 4 0
<u><i>Quercus macrocarpa</i> BUR OAK</u> Very tolerant of heavy clay soil, high Ph, and open areas. The asymmetrical when young, but with age becomes a very stately tree. Bark is brown and deeply fur Preeminent tree of the midwest savanna; one of the best oaks for today's urban environment. Perh		
most impressive of all trees! Grows 50-80'h 50-80'w	1.25"	@ \$145
-	5-Gal	@ \$40.

ORDER SUMMARY

Availability was recently confirmed with our supplier; however, it is still possible (but unlikely) we will not be able to fill your entire order due to circumstances beyond our control. We will refund money for trees or shrubs not delivered and/or offer a substitute.

Orders must be received no later than Monday, Sept. 9th. Please print and mail this form along with your check payable to Citizens for Conservation, 459 W. Hwy. 22, Barrington, IL 60010. For your convenience, we also accept payment by VISA, however, payment by check is preferred because it helps to keep our costs down.

<u>DELIVERY</u>: **Orders should be picked up on Saturday, Sept. 21st between 9 AM to 12 NOON.** If it is not possible to pick up at this time, please phone CFC (847-382-SAVE) to arrange an alternate date. Come to our headquarters at 459 W. Highway 22, the white farmhouse with a silo, across from Good Shepherd Hospital.

	# ORDERED	TOTAL COST		
Shrubs:				
Trees:				
TOTAL AMOUNT	OF ORDER:		\$	
LESS 10% DISCOU	INT FOR CFC ME	EMBERS ONLY:	\$	
AMOUNT DUE:			\$	
NAME:			PHONE:	
VISA NUMBER: _			EXPIRATION DATE:	
SIGNATURE:				

FAT = 890.00 77 THE STATION UNING AREA The Village of Barrington Hills Landscape Development Plan 1998 Barrington Hills, Illinois Founded in 1957



ASH TREES 12 TOTAL 1- EAB

Landmark Design, II Bartlett, Illinois



www.emeraldashborer.info





Frequently Asked Questions Regarding Potential Side Effects of Systemic Insecticides Used To Control Emerald Ash Borer

Jeffrey Hahn, Assistant Extension Entomologist, Department of Entomology, University of Minnesota Daniel A. Herms, Professor, Department of Entomology, Ohio Agricultural Research and Development Center, The Ohio State University Deborah G. McCullough, Professor, Department of Entomology and Department of Forestry, Michigan State University

What systemic insecticides are commonly used to protect ash trees from emerald ash borer (EAB)?

Systemic insecticides containing the active ingredients imidacloprid, dinotefuran or emamectin benzoate are commonly used to protect ash trees from EAB. All three are registered for agricultural use and have been designated by the Environmental Protection Agency as Reduced-Risk insecticides for certain uses on food crops. The most widely used insecticide in the world, imidacloprid has been utilized for many years to control pests of agricultural crops, turfgrass, and landscape plants. Because of its low toxicity to mammals, it is also used to control fleas and ticks on pets. Dinotefuran is a relatively new product that has properties similar to those of imidacloprid, but it has not been researched as thoroughly. Emamectin benzoate, derived from a naturally occurring soil bacterium, has been registered for more than 10 years as a foliar spray to control pests in vegetable and cotton fields and parasitic sea lice in salmon aquaculture. Similar products are used in veterinary medicine as wormers for dogs, horses, and other animals.

To control EAB, some products containing imidacloprid or dinotefuran are applied as a drench



The invasive emerald ash borer has killed millions of ash trees in North America.

directly to the surface of the soil or injected a few inches under the soil surface. Dinotefuran can also be applied by spraying the bark on the lower five feet of the trunk. Emamectin benzoate and specific formulations of imidacloprid are injected directly into the base of the tree trunk. Systemic insecticides are transported within the vascular system of the tree from the roots and trunk to the branches and leaves. This reduces hazards such as drift of pesticide to non-target sites and applicator exposure that can be associated with spraying trees with broad-spectrum insecticides, and has less impact on beneficial insects and other non-target organisms. Many products registered for control of EAB can be applied only by licensed applicators. In all cases, the law requires that anybody applying pesticides comply with instructions and restrictions on the label.



Ash trees lining a street before (left) and after (right) they were decimated by EAB.





Precautions should be taken to prevent pesticides from reaching surface or groundwater.

Will systemic insecticides applied to the soil impact ground or surface water quality?

Several surveys have been conducted in the United States and Canada to monitor imidacloprid in surface and groundwater. Results indicate that imidacloprid is rarely detected in surface water in agricultural or urban areas. Similar monitoring studies have not been conducted with dinotefuran, which is more soluble in water. In the presence of sunlight, imidacloprid and dinotefuran are very unstable in water and degrade rapidly, which reduces their environmental risk to surface water.

When not exposed to light, imidacloprid and dinotefuran break down slowly in water, and thus have the potential to persist in groundwater for extended periods. In surveys of groundwater, imidacloprid was usually not detected. When detected, it was present at very low levels, mostly at concentrations less than 1 part per billion (ppb) with a maximum of 7 ppb, which are below levels of concern for human health. The detections have generally occurred in areas with porous rocky or sandy soils with little organic matter, where the risk of leaching is high — and/or where the water table was close to the surface.

Every precaution should be taken to protect surface and groundwater from pesticide contamination. Trunk-injected insecticides pose little risk to ground and surface water when used as directed because the material is placed inside the tree.

To protect groundwater, soil applications of systemic insecticides should be made immediately adjacent to the trunk of the tree, which increases uptake (and efficacy) because the high density of absorptive roots in this area filters the chemical from the soil. Systemic insecticides bind to varying degrees to organic matter, silt, and clay, which restricts their movement in soil. They should not be applied to porous sandy soils lacking organic matter, especially where the water table is shallow, or when heavy rain is predicted within the next 24 hours.

To protect surface water, systemic insecticides should not be applied to soil near ponds, lakes, or streams. Soil drenches should not be applied to sloped surfaces from which runoff can occur, nor should pesticides be misapplied carelessly to impervious surfaces such as sidewalks or streets, or otherwise allowed to reach conduits to surface water such as drains, ditches, or gutters.

The imidacloprid profile presented in the Extension Toxicology Network Pesticide Information concluded there is generally not a high risk of groundwater contamination when products are used as directed and appropriate precautions are taken. Similarly, the Canadian Water Quality Guidelines for the Protection of Aquatic Life noted that when imidacloprid is used correctly, it does not characteristically leach into deeper soil layers.

Will these insecticides impact aquatic organisms?

The toxicity of imidacloprid to aquatic life varies. Studies indicate it has low toxicity to fish, amphibians, and some aquatic invertebrates such as Daphnia (small aquatic crustaceans), but high toxicity to other invertebrates such as mysid shrimp (a salt water species) and larvae of some aquatic insects such as midges, black flies, and mosquitoes. Dinotefuran is not as thoroughly researched, but existing data reflect a pattern of toxicity similar to that of imidacloprid. Toxicity to fish and Daphnia is low, while mysid shrimp are sensitive. As previously noted, imidacloprid and dinotefuran are broken down rapidly in water when exposed to light. In the rare occasions when imidacloprid has been detected in surface water, the levels were too low (less than 1 ppb) to impact even sensitive aquatic organisms.

Imidacloprid soil injections have been widely used in ravines of Smoky Mountain National Park and other forested areas to control hemlock woolly adelgid, an invasive insect that is devastating hemlock trees in the Appalachian Mountains. A risk assessment prepared for the USDA Forest Service ("Imidacloprid – Human Health and Ecological Risk Assessment") concluded that these treatments pose negligible risk to aquatic organisms when applied as directed to clay or loam soils, and that even a worst-case scenario of a major spill of imidacloprid into a small pond would have negligible effects on fish, amphibians, or tolerant aquatic invertebrates. When used as directed, imidacloprid soil treatments for EAB control are unlikely to impact aquatic organisms.

What about insecticide residues in senesced leaves that fall from trees in autumn?

This question has not been thoroughly researched. One study conducted in experimental microcosms found that imidacloprid residues in senesced (dead) leaves from treated trees had no effect on microbial respiration or decomposition, or survival of leaf-shredding insects that decompose dead vegetation. Insect feeding rates were decreased by imidacloprid concentrations of 1.3 parts per million (ppm), while lower concentrations (0.8 ppm) had no effect. When leaf-shredding insects or earthworms were given senesced maple leaves with higher concentrations of imidacloprid (3-11 ppm), their feeding rates were reduced but their survival was not affected. In another microcosm study, imidacloprid inhibited breakdown of leaf litter, but foliar concentrations in this study (18-30 ppm fresh weight) were more than an order of magnitude higher than those reported in leaves from trees treated for EAB control. In all of these experiments, organisms were exposed only to leaves from treated trees. In many situations, leaves from treated ash trees would be mixed with senesced leaves of other species growing nearby.

Similar studies have not been conducted with emamectin benzoate, which is broken down rapidly by microbial activity and sunlight. Because of its short residual activity on the surface of leaves, it is considered a biorational insecticide compatible with integrated pest management programs, including biological control. These characteristics suggest that environmental impacts will be negligible as emamectin benzoate is released from decomposing leaves. Regulatory agencies concluded that foliar applications of emamectin benzoate to vegetable crops will have no adverse effects on ground or surface water, birds, mammals, fish, or aquatic invertebrates when used as directed.

Will these insecticides harm honey bees?

Ash trees are wind-pollinated and are not a nectar source for bees. Furthermore, ash flowers are produced early in the growing season and are present for only a limited number of days. It is highly unlikely that bees would be exposed to systemic insecticides applied to ash.

Flowering plants that are pollinated by bees or other insects should not be planted immediately adjacent to ash or other trees that will be treated with systemic insecticides applied to the soil, as they may also absorb insecticide. Honey bees and other insects can be affected when systemic insecticides



Honey bees and other pollinators can be harmed by insecticides applied to flowering plants.

are translocated to nectar and pollen. Imidacloprid is fatal to honey bees when it reaches high enough concentrations, and can have harmful sublethal effects at lower concentrations.

There has been much concern recently about the potential role of imidacloprid and related neonicotinoid insecticides in colony collapse disorder (CCD). Research is ongoing to investigate the relative effects of pesticides, bee pathogens and parasites, and nutrition on honey bee health. To date there are no conclusive answers, but researchers have not been able to establish a link between imidacloprid and CCD. Stronger evidence implicates a combination of pathogens as well as other pesticides used in hives to control pests that afflict bees.

Will these insecticides harm other insects?

All of the systemic insecticides used to control EAB will impact other species of insects that feed on treated ash trees. However, ash trees that are not treated will be killed by EAB, which will also impact these insects. Some products can affect many kinds of insects, while others affect only certain groups of insects. For example, emamectin benzoate has been shown to affect a broad range of plant-feeding insects. Products with imidacloprid generally have little effect on caterpillars, mites, and armored scales, but will impact most sawflies, leaf-feeding beetles, and sap-feeding insects such as aphids and soft scales. Studies have shown that beneficial insect predators and parasitoids - such as lady beetles, lacewings, and parasitic wasps - can be killed by indirect exposure to imidacloprid through their prey, or directly by feeding on nectar from treated plants. However, systemic insecticides are generally considered to have less impact on natural enemies than broad-spectrum insecticides applied as foliar or cover sprays.



Woodpeckers are important predators of overwintering EAB larvae.

Will these insecticides harm woodpeckers?

This is unlikely. Woodpeckers feed on live, mature EAB larvae, mostly in late fall, winter and early spring. Many of these mature larvae overwinter in the nonliving, outer bark where they will not be exposed to systemic insecticides. Imidacloprid, dinotefuran, and emamectin benzoate are much more toxic to insects than to birds that have been tested, and insecticide concentrations that have been measured in treated trees are far below the levels known to be toxic to birds. An EAB larva that has been killed by insecticide will desiccate quickly and decompose. There is little evidence that woodpeckers will feed on larval cadavers. Furthermore, living larvae that are suitable prey for woodpeckers will not have been exposed to a lethal dose of insecticide, and these products do not bio-accumulate in animals in the way that fat-soluble insecticides such as DDT do. In Michigan and Ohio, where EAB has been established for several years, many ash trees have been treated with systemic insecticides. There have been no reported cases of woodpecker poisoning caused by insecticides applied for control of EAB.

Does injecting insecticides into trunks injure the trees?

Drilling through the outer bark creates a wound in the tree. The response of the tree to these wounds is affected by factors such as the size and depth of the hole and the vigor of the tree. In recent studies, the injury associated with drilling holes and injecting two insecticide products (Imicide® applied with Mauget® capsules and TREE age[™] applied with the ArborjetTree IV[™] and Quickjet[™]) into trunks of ash trees was examined. In nearly all cases, ash trees that were relatively healthy and properly injected showed little evidence of damage. New, healthy wood was produced over the injection sites and there was no evidence of pathogen infection, decay, or other signs of serious injury. Other devices used to inject ash trees generate wounds that differ from those caused by drilling discrete holes in the tree. However, their impact has not been thoroughly evaluated in research projects. We do know that untreated ash trees in areas with EAB infestations will eventually be killed.

Will treating ash trees result in development of resistance of EAB to insecticides?

This is highly unlikely. Pests typically evolve resistance to pesticides only in situations where a high proportion of the insect population was subjected to strong selection pressure. For example, pesticide resistance has evolved in insect and weed populations in agricultural fields, greenhouses, and grain storage bins where nearly all of the pest population was exposed to the pesticide. Ash trees are very common in many natural environments. Landscape trees represent a small fraction of all the ash that will be colonized by EAB in a given area, and only a small proportion of high-value trees will ever be treated to control EAB. Thus, most of the EAB population will never be exposed to insecticides. Because the selection pressure is so low, and there will be plenty of cross breeding with individuals that have never been exposed to insecticides, the risk of a resistant EAB population evolving is minimal.

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