

# BARE-ROOT TREE PLANTING GUIDE



## SELECTING THE RIGHT TREE

Selecting the right tree for your purpose is the first step in a successful planting. Although some general guidelines can be given, every situation is unique. Soil properties, moisture levels, and available light vary on every site. Species to plant should be selected carefully based on site conditions, planting objectives, species requirements, and diversity. Planting a diversity of species will limit potential negative impacts from unforeseen pest and disease outbreaks.

To help you select the right tree for your planting we have included a Tree & Shrub Information Table (pgs. 3-4) that lists 76 species common to Ohio including details on requirements and common traits for each species. For a large planting it is recommended that a professional forester or conservation professional be consulted beforehand. A directory of ODNR Service Foresters is found on our website at [forestry.ohiodnr.gov/serviceforesters](http://forestry.ohiodnr.gov/serviceforesters).

The ODNR Division of Forestry encourages all woodland owners to have a written woodland management plan for their property that details their objectives, goals, and future management activities. We recommend maintaining a natural diversity of native species. Tree planting is a great way for landowners to increase species diversity.



Research has shown that tree planting in existing woodland areas is generally not necessary, practical, or cost effective. There are exceptions for very special objectives where a landowner is committed to the process of weeding and releasing the planted trees for 10 to 15 years. Landowners that want to introduce a new species to their woods should look for woodland canopy gaps or dying trees to plant under and control competing trees as needed. This may be necessary in a woods dominated by ash, dying from EAB. Without planting, ash seedlings may grow back just to die again when they are larger.

The Division of Forestry recommends native species. On non-forested sites we encourage planting hardwoods alone or mixed with pine depending on soils and topography. Hardwoods can have more desirable growth characteristics with pine mixed in. If site conditions are favorable the following species are good options: red oak, white oak, bur oak, swamp white oak, bitternut hickory, shagbark hickory, tuliptree (yellow poplar), black cherry, and black walnut.

## ORDERING AND PLANTING

### WHEN TO PLANT

Spring planting is recommended for bare-root seedlings. Fall planting is not recommended because recently planted seedlings are usually not able to withstand severe frost heaving. Bare-root evergreens planted in the fall may not be able to fully establish their root system until spring, which can cause needles to dry out from winter winds and frozen conditions.

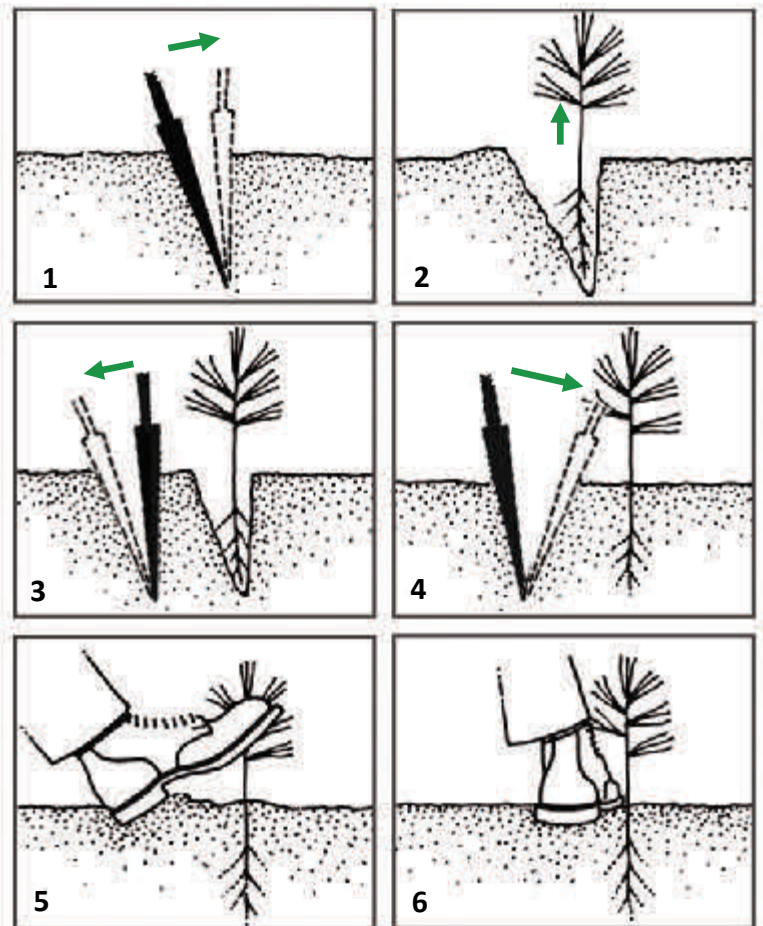
### ENHANCED SEEDLINGS

#### Mycorrhizal Inoculated Trees (PT Stock)

Some tree seedlings are inoculated at planting with a mycorrhizal fungi to enhance seedling growth rate and survival on harsh sites such as strip mine land. Check with your local service forester if you believe your site needs this stock.

## HOW TO PLANT

1. Insert dibble at angle shown & push forward to upright position.
2. Place seedling in hole, pull up to nursery depth, & straighten roots.
3. Insert dibble 2 inches from seedling & pull handle toward planter.
4. Push handle toward seedling (3 & 4 → packs soil at bottom & top).
5. Fill in second hole by stomping with heel.
6. Pack soil around seedling with feet.



## SEEDLING SPACING

Before planting consider the purpose of the planting and the growth potential of seedlings in height and width to determine the appropriate tree spacing. Your local service forester can provide you with specific recommendations for your property and planting objectives. As a general rule, seedlings should be spaced as follows:

Purpose	Spacing
Reclamation	4-6'
Timber	8-12'
Wildlife	3-6'
Windbreaks	5-10'

### QUANTITY NEEDED PER ACRE

Spacing	6'x 6'	7'x 7'	8'x 8'	9'x 9'	10'x10'	11'x11'	12'x12'
Quantity/Acre	1,210	889	681	538	436	360	302

## SEEDLING CARE

### CARE ON ARRIVAL

After receiving your tree seedlings they need to be kept damp and stored in a cool location until planting. If you intend to plant the trees within a week, keep them in the shipping package in a cool shaded location, such as a cooler (above freezing), basement, outbuilding or on the north side of a building.

If planting will be delayed longer than a week, open the package, make sure that the roots and packing materials are damp, reseal, and store the package in a cool place, periodically checking the condition of the trees' roots. Or, dig a trench deep enough to accommodate the roots, carefully place roots in the trench, and cover with topsoil. Do not allow the roots to dry out.

Spring seedlings are at the end of their dormant season. Like all trees they need sunlight, carbon dioxide, oxygen and water to get a fresh start each spring. The longer you wait to plant your trees the fewer will survive regardless of the care given.

### CARE OF ROOTS

When planting bare root seedlings it is important that the roots are planted straight up and down, and not bunched up at the bottom of the planting hole, or "J" rooted. A "Y-shaped" stick may be used to straighten roots in the hole while planting.

Sometimes it may be necessary to prune the roots prior to planting if the seedling's roots are longer than the depth of the hole you are making. A dibble or tree planting bar makes a hole about 8 to 10 inches deep. If the roots are longer a sturdy spade may be substituted for the dibble bar to make a deeper hole.

If the roots need to be pruned they should be trimmed so they are no longer than the depth of the planting hole. Pruning shears or another sharp tool may be used. It is never recommended to remove more than 25% of the root system. If you notice white tissues forming at ends of the roots, the roots have started to elongate prior to planting and it is not recommended to prune them at this point.

## SEEDLING CARE

### SEEDLING PROTECTION

Young trees can be damaged by a variety of animals including rabbits, squirrels, groundhogs, voles, and deer. However the most common culprits are deer. In areas where deer are abundant it can be a real challenge to establish tree seedlings.

Actions that discourage deer from damaging seedlings include but are not limited to tree shelters, hunting, fencing, bud caps, chemical repellents, scare tactics, and selecting species that deer are less likely to prefer. Tree shelters are one of the most effective methods. Tree shelters are plastic tubes 2-6 feet long that protect seedlings from animal browse, herbicide, and mowing. They also create a mini-greenhouse maintaining moisture and a more stable temperature.

Another threat is damage from wildfires. In Ohio wildfires are most common in the spring and fall seasons, especially during dry windy conditions. Besides killing trees, fire can expose roots and leave scars that may lead to fungal infections like root and butt rot. To minimize this threat, fire lanes should be established around the edges of the planting and disked once a year. Disking or plowing should be done "on the contour" to minimize erosion.



### CARE AFTER PLANTING

After planting, it is necessary to take certain precautions to protect this investment of time, money, and effort. Mowing and weed control around seedlings is needed for two or three years after planting to keep weeds from competing with the young seedlings and to help keep rodents away.

Tree plantings should also be protected from livestock. Grazing destroys more timber in Ohio than fire does. Livestock not only eat young seedlings, they trample the protective leaf cover and topsoil, which results in erosion and loss of soil moisture.

Diseases and insect pests can become a serious threat to your trees. It is important to regularly monitor the health of your trees. If excessive damage is found contact your local service forester to help identify the cause and best treatment options.

If practical it is good to mulch around trees to help keep weeds down until lower branches of the trees cover the area. A layer of aged straw, peat, and/or woodchips at a depth of 2 to 3 inches and for a distance of 4 feet is effective.

For additional information on care after planting or seedling protection contact your local service forester.



# OHIO TREE & SHRUB SPECIES INFORMATION TABLE

COMMON NAME <i>Scientific name</i>	MATURE HEIGHT (feet)	MATURE SPREAD (feet)	GROWTH RATE s=slow m=med f=fast	x = yes			p = preferred										GENERAL NOTES	
				MULTI-STEM	EVER-GREEN	NATIVE	SOIL MOISTURE			LIGHT REQUIREMENTS		BENEFITS, SERVICES, & USES						
							Dry	Well Drained	Wet	Sun	Shade	Shade	Wildlife	Wind-break	Timber	Wet-land		Reclaim Mine-land
Arborvitae, American <i>Thuja occidentalis</i>	30-50'	10-20'	s-m	x	x	x	x	x	x	p	x				x			Very tolerant of alkaline soils.
Baldcypress <i>Taxodium distichum</i>	60-80'	20-30'	m-f				x	x	p	p	x				x	x	x	Excellent wetland species. Native to the southern US (drops its needles in the fall).
Basswood, American <i>Tilia americana</i>	70-90'	40-60'	m-f			x			p		x	p	x	x		x		The flower produces rich nectar, is a favorite of bees & makes choice honey.
Beech, American <i>Fagus grandifolia</i>	60-80'	40-70'	s-m			x	x		p		x	p	x	x				Trunks are often hollow & provide excellent den sites for various wildlife.
Birch, Black (Sweet Birch) <i>Betula lenta</i>	60-80'	30-45'	m			x			p	x	x	p	x	x			x	Can tap in spring & ferment sap to make birch beer. Twigs have wintergreen aroma.
Birch, River <i>Betula nigra</i>	50-70'	20-40'	m	x		x			x	p	p			x	x		x	Ornamentally valued for its flaky orange & cream-colored bark.
Yellow Birch <i>Betula alleghaniensis</i>	60-80'	30-55'	m			x			p	x	x	p	x	x		x		Bark peels are flammable & can be used to start a fire, even when wet.
Blackhaw <i>Viburnum prunifolium</i>	12-15'	8-12'	s-m			x			p	x	x	p	x	x	x		x	Viburnum shrub. Dark green foliage in summer & purple/red in autumn.
Buckeye, Ohio <i>Aesculus glabra</i>	40-60'	20-40'	m			x			p	x	x	p	x	x				Leaves prone to scorching, discoloration & foliar diseases by mid-summer.
Buckeye, Yellow <i>Aesculus flava</i>	60-80'	30-40'	m			x			p	x	x	p	x	x	x	x		Best shade buckeye. Nut husk is spineless unlike Ohio buckeye.
Butternut <i>Juglans cinerea</i>	40-70'	30-50'	s-m			x			p		p			x		x		Tolerant of alkaline soils. Edible nut. Large trees rare due to canker/fungus.
Buttonbush <i>Cephalanthus occidentalis</i>	5-10'	10-15'	m	x		x					p	p		x			x	Good for wetlands & stabilizing shorelines, cuttings will root in moist soils.
Cherry, Black <i>Prunus serotina</i>	60-80'	30-40'	m-f			x	x		p		p			x		x		Berries are an important food for wildlife, provides quality timber especially in NE OH.
Coffeetree, Kentucky <i>Gymnocladus dioica</i>	70-80'	40-50'	m			x			p		p	x					x	Tolerant of alkaline soils. Pioneers used the beans as a coffee substitute.
Cottonwood, Eastern <i>Populus deltoides</i>	80-110'	60-90'	f			x	x	x	x	p	p					x	x	Small seeds attached to cotton-like strands released in late spring.
Crabapple, American <i>Malus coronaria</i>	15-25'	15-25'	s-m			x	x		p	x	p	x		x	x		x	Large size crabapple fruit.
Crabapple, Sargent <i>Malus sargentii</i>	6-8'	8-10'	s-m					x	p		p			x	x		x	Native to Japan. Resistant to apple scab disease.
Cucumbertree <i>Magnolia acuminata</i>	60-80'	40-60'	m-f			x			p		x	x		x		x		The most cold-hardy magnolia with its northern range reaching southern Ontario.
Dogwood, Flowering <i>Cornus florida</i>	15-30'	15-20'	s-m			x			p			p		x				Showy spring flowers; autumn red fruit & crimson foliage.
Dogwood, Gray <i>Cornus racemosa</i>	10-15'	10-15'	m	x		x			p	x	x	p	x	x	x		x	Very adaptive to different sites.
Dogwood, Red Osier <i>Cornus sericea</i>	10-15'	10-15'	m	x		x				p	p	x		x	x		x	Provides winter color to landscapes with its thin red branches.
Dogwood, Silky <i>Cornus amomum</i>	6-10'	6-10'	m	x		x			p	x	p	x	x	x	x		x	Blue-black fruits mature in mid-summer, a favorite of birds & squirrels.
Hackberry <i>Celtis occidentalis</i>	60-80'	50-60'	m			x			p	x	p			x			x	Prefers alkaline soil, tolerates poor sites. Prone to cosmetic leaf/twig diseases.
Hawthorn, Washington <i>Crataegus phaenopyrum</i>	20-30'	20-25'	s-m			x	x		p	x	p	x		x	x		x	May have thorns. Spring white flowers; orange-red fruits in autumn/winter.
Hazelnut, American <i>Corylus americana</i>	8-10'	3-5'	s-m	x		x	x		p		x	x		x				Edible nut. Best nut production occurs in full sun.
Hemlock, Eastern <i>Tsuga canadensis</i>	80-120'	30-50'	s-m		x	x			p	x		p	x	x				Prefers cool, northern slopes, gorges. Threatened by Hemlock Woolly Adelgid.
Hickory, Bitternut <i>Carya cordiformis</i>	60-90'	40-65'	m			x			p	x	p	x		x		x	x	Bark is smooth for hickories. Nuts are bitter & ill-fit for human consumption.
Hickory, Mockernut <i>Carya alba</i>	60-90'	40-70'	m			x	x		p		p	x		x		x		Edible nut is important food for wildlife, especially squirrels, which eat green nuts.
Hickory, Pignut <i>Carya glabra</i>	60-90'	40-70'	m			x	x		p		p	x		x		x		Edible nut (bitter to humans) are eaten by various species of wildlife.
Hickory, Shagbark <i>Carya ovata</i>	70-100'	40-70'	m			x	x		p		p	x		x		x		Edible sweet nut. Shaggy bark peels in long vertical strips from the trunk & branches.
Hickory, Shellbark <i>Carya laciniosa</i>	60-90'	40-70'	m			x			x	p	p	x		x		x	x	Largest leaf & nut of all the hickories. Edible sweet nut relished by squirrels.
Honeylocust <i>Gleditsia triacanthos</i>	50-70'	30-50'	m-f			x	x		p	x	p	x		x			x	Adaptive to different sites. Has large thorns, but ornamental varieties are thorn-less.
Hophornbeam, Eastern <i>Ostrya virginiana</i>	25-50'	15-35'	s			x	x		p	x	x	p	x	x				AKA Ironwood. Hop-like nuts provide food for grouse & look like hops used for beer.
Hornbeam, American <i>Carpinus caroliniana</i>	15-35'	15-35'	s	x		x	x		p	x	x	p	x	x				AKA: musclewood (muscular-appearance), blue beech (smooth bark) & ironwood (hard to cut)
Larch, Eastern <i>Larix laricina</i>	50-70'	15-25'	s-m			x			x	p	p					x	x	Deciduous conifer also called tamarack, native to NE Ohio.
Locust, Black <i>Robinia pseudoacacia</i>	50-70'	25-50'	m-f			x	x		p	x	p	x			x		x	Resistant to decay, good for fence posts.
Maple, Red <i>Acer rubrum</i>	50-80'	40-65'	m-f			x	x		p	x	x	p	x	x		x	x	Named for its red twigs, buds, spring flowers & red autumn foliage.
Maple, Silver <i>Acer saccharinum</i>	60-90'	40-80'	f			x	x		x	p	p	x		x		x	x	Adaptive to different sites. Prone to storm damage. Underside of leaf is silver (name).



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							Dry	Well Drained	Wet	Sun	Partial Shade	Shade	Wildlife	Wind-break	Timber	Wet-land		Reclaim Mine-land	
Maple, Sugar <i>Acer saccharum</i>	70-100'	40-65'	m			x			p		x	p	x	x		x			AKA hard maple. Best maple for syrup production. Outstanding autumn colors.
Nannyberry <i>Viburnum lentago</i>	8-20'	8-15'	s-m	x		x			p	x	x	p	x	x			x		Produces attractive flowers, fruit & autumn color. Fruit is eaten by many kinds of birds.
Oak, Black <i>Quercus velutina</i>	50-80'	40-60'	m			x	x		p					x		x		x	Grows on a wider variety of soils than most oaks. Drought tolerant.
Oak, Bur <i>Quercus macrocarpa</i>	70-90'	60-80'	m			x			p	x	p	x		x	x	x	x	x	Adaptive to different soils. Fringed rough acorn caps (mossy). AKA mossycup oak.
Oak, Chestnut <i>Quercus prinus</i>	70-100'	40-60'	m			x		p	x		p			x		x			Leaves resemble American chestnut. Bark has thick triangular ridges & deep furrows.
Oak, Chinkapin <i>Quercus muehlenbergii</i>	60-80'	40-80'	m			x	x		p		p			x		x		x	Prefers alkaline soils with high pH, but will tolerate neutral to acidic soil.
Oak, Pin <i>Quercus palustris</i>	70-100'	40-70'	m			x			x	x	p	p			x	x	x	x	Plant on acidic soils (low pH). On alkaline soils Chlorosis (yellow leaves) occurs.
Oak, Northern Red <i>Quercus rubra</i>	70-100'	40-70'	m			x	x		p	x	p	x			x	x	x		Shade tolerant in youth. Large acorns. Important tree for timber & wildlife.
Oak, Sawtooth <i>Quercus acutissima</i>	40-60'	35-50'	m				x		p	x	p			x				x	Good wildlife tree. Good sites produce nuts in 5-8 years. Native to east Asia.
Oak, Scarlet <i>Quercus coccinea</i>	60-90'	50-70'	m			x		p	x		p			x		x			Intolerant of alkaline soils. Drought tolerant. Named for its autumn color.
Oak, Shingle <i>Quercus imbricaria</i>	60-80'	40-70'	m			x			p	x	p	x		x	x	x			Oval, smooth unlobed margin on leaf (unique for OH oaks). Holds dead leaves into winter.
Oak, Shumard <i>Quercus shumardii</i>	60-90'	40-80'	m			x	x		p		p			x		x			Will tolerate alkaline soils & is fairly drought tolerant.
Oak, Swamp Chestnut <i>Quercus michauxii</i>	60-80'	40-60'	m						x		p	p		x		x	x		Native to the southern US but tolerates cold enough to plant in southern Ohio.
Oak, Swamp White <i>Quercus bicolor</i>	60-80'	60-80'	m			x			x		p	p	x		x	x	x		Common in northwest Ohio. Good on wet sites & tolerates slightly alkaline soils.
Oak, White <i>Quercus alba</i>	70-100'	60-90'	m			x	x		p		p	x		x		x			Shade tolerant in youth. Important tree for timber, acorns preferred by wildlife.
Pawpaw <i>Asimina triloba</i>	15-20'	15-20'	m	x		x	x		p	x	x	p	x	x					Prefers shade in youth. Needs partial sun & genetically dissimilar pollen to fruit.
Persimmon <i>Diospyros virginiana</i>	40-60'	30-40'	s-m			x	x		p		p			x	x				Edible fruit. A dioecious species (needs male & female trees to produce fruit).
Pine, Austrian <i>Pinus nigra</i>	50-70'	35-60'	m		x			x	p		p	x		x	x	x		x	Native to Europe. Pine most tolerant to de-icing salt. Susceptible to diplodia tip blight.
Pine, Loblolly <i>Pinus taeda</i>	70-90'	20-40'	f		x			x	p		p			x	x	x			Native to the southern US. Don't plant north of State Route 32.
Pine, Pitch <i>Pinus rigida</i>	40-70'	20-50'	m		x	x	x		p		p			x		x		x	One of few pines that can re-sprout from stump after disturbance (especially fires).
Pine, Pitlolly <i>Pinus rigida x taeda</i>	40-70'	20-45'	m-f		x			x	p		p			x	x	x			A hybrid of Pitch & Loblolly Pine. Tolerates bitter cold better than Loblolly.
Pine, Shortleaf <i>Pinus echinata</i>	40-70'	20-40'	m		x	x	x		p		p			x		x			Native to southern Ohio. Young trees are able to re-sprout following fire.
Pine, White <i>Pinus strobus</i>	80-120'	20-50'	m-f		x	x	x		p		p	x		x	x	x			Intolerant of poor drained alkaline soils. WP weevil can kill main leader & distort form.
Pine, Virginia <i>Pinus virginiana</i>	35-65'	15-40'	s-m		x	x		p	x		p			x				x	Thrives on poor sites, drought tolerant. Slow grower, shrubby form & scraggly.
Plum, American <i>Prunus americana</i>	20-30'	12-20'	s-m	x		x	x		p	x		p		x	x			x	Edible fruit is sweet when fully ripe & makes excellent jelly or jam.
Redbud <i>Cercis canadensis</i>	15-25'	15-20'	s-m	x		x	x		p		x	p		x					Known for showy lavender-pink flowers that bloom days before the leaves emerge.
Redcedar, Eastern <i>Juniperus virginiana</i>	30-50'	10-25'	s-m		x	x	x		p		p			x	x	x		x	Don't plant near apple orchards (cedar-apple rust). Likes alkaline soils.
Sassafras <i>Sassafras albidum</i>	30-60'	25-45'	m	x		x	x		p	x	p	x		x					Has a spicy aroma. Its roots have been used for perfume, soaps, tea & root beer.
Serviceberry, Downy <i>Amelanchier arborea</i>	15-40'	10-25'	s-m	x		x	x		p		x	p		x	x				The berries are edible & make wonderful pies & jams. An important wildlife tree.
Spruce, Norway <i>Picea abies</i>	60-90'	25-40'	m-f		x				p	x	p	x		x	x	x			Native to Europe but not considered invasive.
Spruce, White <i>Picea glauca</i>	40-65'	15-30'	s-m		x				p		p	x		x	x				Native to northern US. The smallest cones & needles of any spruce found in Ohio.
Sweetgum <i>Liquidambar styraciflua</i>	60-90'	40-80'	m			x	x		x	p	p	x		x		x	x	x	Its name comes from the taste of hard sap that will form from wounds on the tree.
Sycamore, American <i>Platanus occidentalis</i>	70-110'	60-90'	f			x			x	p	p	x				x	x	x	By circumference the most massive tree in the eastern US. Prone to leaf diseases.
Tuliptree (Yellow Poplar) <i>Liriodendron tulipifera</i>	80-120'	30-70'	f			x	x		p		p	x				x		x	Tallest tree in eastern US. Flowers are a favorite of bees for making honey.
Tupelo, Black (Blackgum) <i>Nyssa sylvatica</i>	40-80'	35-50'	m			x			p	x	x	x		x					Dark green glossy summer leaves, brilliant red in autumn, berries important for wildlife.
Walnut, Black <i>Juglans nigra</i>	60-85'	40-70'	m			x			p	x	p			x	x	x			Edible nut. Highly valued timber tree & important for wildlife.
Willow, "Streamco" <i>Salix purpurea</i>	12-15'	10-15'	f	x						p	p	x		x				x	Native to Europe. Used for stream bank stabilization.
Witchhazel, Common <i>Hamamelis virginiana</i>	15-25'	15-25'	m	x		x	x		p	x	x	x		x					Yellow flowers appear in fall, twisted ribbon-like petals.