CLIMATE CHANGE VULNERABILITY OF URBAN TREES
NEW YORK, NEW YORK

Green & Growing

This list was developed to aid New York City community forestry practitioners in selecting trees to reduce climate change vulnerability of their urban forests. It is meant to be a complement to other tree selection resources. Other factors may also need to be considered, such as aesthetics, local site conditions, wildlife value, or nursery availability. It is also important to note that some species may have climate benefits but may not be suitable for planting for other reasons, such as having invasive potential or susceptibility to pests or pathogens.

Vulnerability: Trees can be vulnerable to a variety of climate-related stressors such as intense heat, drought, flooding, and changing pest and disease patterns. Climate vulnerability is a function of the impacts of climate change on a species and its adaptive capacity. Species with negative impacts on habitat suitability and low adaptive capacity will have high vulnerability and vice versa. The following factors were used to determine climate vulnerability:

Urban adaptability: Adaptability scores were generated for each species based on literature describing its tolerance to disturbances such as drought, flooding, pests, and disease, as well as its growth requirements such as shade tolerance, soil needs, and ease of nursery propagation. Scores were assigned to species using methods developed in an urban forest vulnerability assessment for Chicago for trees planted in developed sites. A positive score indicates that a species is tolerant to a wide range of disturbances and can be planted on a variety of sites. A negative score indicates a species is highly susceptible to disturbances and/or is limited to specific planting sites.

Hardiness and heat zone suitability: Tree species ranges were recorded from government, university, and arboretum websites. Species tolerance ranges were compared to current and projected heat and hardiness zones for New York, New York using downscaled climate models under low emissions (RCP 4.5) and high emissions (RCP 8.5) scenarios for changes in greenhouse gases. Trees were considered to have suitable zone suitability if the species' tolerance was within the range of current and projected hardiness and heat zone through the end of the 21st century.

NOTE: This list was primarily created for species planted in developed sites, such as streets, yards, boulevards, and parks. If you are interested in projected changes in habitat suitability for native species in natural areas, see the Climate Change Tree Atlas at **www.fs.fed.us/nrs/atlas/**.

Current and projected USDA Hardiness Zones and AHS Heat Zones for New York, New York. Hardiness zone is determined by the average lowest temperature over a 30 year period. Heat zones are determined by the number of days above 86°F.

Time Period	Hardiness Zone Range		Heat Zone Range	
1980–2010	7		5	
	Low Emissions	High Emissions	Low Emissions	High Emissions
2010–2039	7	8	6	6
2040–2069	7 to 8	8 to 9	7	8
2070–2099	8	8 to 9	7	9

NIACS
Northern Institute of Applied Climate Science

www.forestadaptation.org

COMMON NAME	ADAPT	LOW EMISSIONS		HIGH EMISSIONS	
		ZONE SUIT	VULN	ZONE SUIT	VULN
Allegheny serviceberry	+	✔	▼	✔	▼
American beech	·	✔	●	✔	●
American chestnut	−	✔	⊖	✘	△
American elm	·	✔	●	✔	●
American holly	+	✔	▼	✔	▼
American linden, Basswood	·	✔	●	✘	○
American plum	·	✔	●	✘	○
American sycamore	·	✔	●	✔	●
Amur corktree*	·	✔	●	✘	○
Amur honeysuckle*	+	✔	▼	✔	▼
Amur maple*	·	✔	●	✘	○
Amur privet*	+	✔	▼	✔	▼
Atlantic white cedar	+	✔	▼	✘	⊖
Austrian pine	·	✔	●	✘	○
Autumn olive*	·	✔	●	✘	○
Bald cypress	+	✔	▼	✔	▼
Balsam fir	·	✔	●	✘	○
Bitternut hickory	·	✔	●	✔	●
Black ash	−	✔	⊖	✘	△
Black cherry	−	✔	⊖	✔	⊖
Black locust	·	✔	●	✔	●
Black oak	−	✔	⊖	✘	△
Black tupelo, Black gum	+	✔	▼	✔	▼
Black walnut	−	✔	⊖	✔	⊖
Black willow	−	✔	⊖	✔	⊖
Blackhaw	+	✔	▼	✔	▼
Blue spruce	·	✔	●	✘	○
Boxelder	·	✔	●	✘	○
Bur oak	+	✔	▼	✔	▼
Burningbush*	+	✔	▼	✔	▼
California privet*	+	✔	▼	✔	▼
Callery pear*	·	✔	●	✘	○
Chestnut oak	+	✔	▼	✔	▼
Chinkapin oak	+	✔	▼	✘	⊖
Chokecherry	·	✔	●	✘	○
Cockspur hawthorn	·	✔	○	✘	○
Common buttonbush	−	✔	⊖	✔	⊖
Common hackberry	+	✔	▼	✔	▼
Common horsechestnut	·	✔	●	✘	○
Common lilac	·	✔	●	✘	○
Common linden	·	✔	●	✘	○
Common persimmon	+	✔	▼	✔	▼
Cornelian cherry dogwood	·	✔	●	✘	○
Cucumber tree	·	✔	●	✘	○
Dawn redwood	·	✔	●	✔	●

COMMON NAME	ADAPT	LOW EMISSIONS		HIGH EMISSIONS	
		ZONE SUIT	VULN	ZONE SUIT	VULN
Downy serviceberry	+	✔	▼	✔	▼
Eastern cottonwood	−	✔	⊖	✔	⊖
Eastern hemlock	−	✔	⊖	✘	△
Eastern redbud	·	✔	●	✔	●
Eastern redcedar	+	✔	▼	✔	▼
Eastern serviceberry	·	✔	●	✘	○
Eastern white pine	−	✔	⊖	✘	△
European alder*	·	✔	●	✘	○
European beech	·	✔	●	✘	○
European elderberry	·	✔	●	✘	○
European mountain ash	·	✔	●	✘	○
European privet*	+	✔	▼	✔	▼
Flowering dogwood	·	✔	●	✔	●
Fragment sumac	+	✔	▼	✘	⊖
Ginkgo	+	✔	▼	✔	▼
Glossy buckthorn*	+	✔	▼	✘	⊖
Goldenrain tree*	+	✔	▼	✔	▼
Gray birch	−	✔	⊖	✘	△
Gray dogwood	·	✔	●	✘	○
Green ash	·	✔	●	✔	●
Hawthorn	·	✔	●	✔	●
Hedge maple	·	✔	●	✘	○
Honeylocust*	·	✔	●	✔	●
Ironwood	+	✔	▼	✔	▼
Japanese maple	·	✔	○	✘	○
Japanese snowbell	·	✔	●	✘	○
Kentucky coffeetree	+	✔	▼	✔	▼
Kousa dogwood	+	✔	▼	✘	⊖
Littleleaf linden	+	✔	▼	✘	⊖
London planetree	·	✔	●	✔	●
Mockernut hickory	·	✔	●	✔	●
Musclewood	+	✔	▼	✔	▼
Nannyberry	+	✔	▼	✘	⊖
Northern catalpa	·	✔	●	✘	○
Northern red oak	·	✔	●	✔	●
Northern white cedar, Arborvitae	+	✔	⊖	✘	⊖
Norway maple*	+	✔	⊖	✘	⊖
Norway spruce	·	✔	●	✘	○
Ohio buckeye	·	✔	○	✘	○
Osage-orange	·	✔	●	✔	●
Paper birch	·	✔	○	✘	○
Pignut hickory	·	✔	●	✘	○
Pin oak	·	✔	○	✘	○
Pitch pine	−	✔	△	✘	△
Post oak	·	✔	●	✔	●

*Invasive species

COMMON NAME	ADAPT	LOW EMISSIONS		HIGH EMISSIONS	
		ZONE SUIT	VULN	ZONE SUIT	VULN
Princesstree*	+	✔	▼	✗	⊖
Pussy willow	−	✔	⊖	✗	△
Quaking aspen	·	✔	●	✗	○
Red maple	·	✔	●	✔	●
Red mulberry	·	✔	●	✔	●
Red pine	−	✔	⊖	✗	△
River birch	·	✔	●	✔	●
Rose of Sharon	+	✔	▼	✔	▼
Russian olive*	+	✔	▼	✗	⊖
Sassafras	·	✔	●	✔	●
Scarlet oak	·	✔	●	✔	●
Shagbark hickory	−	✔	⊖	✗	△
Shellbark hickory	−	✔	⊖	✗	△
Shingle oak	+	✔	▼	✗	⊖
Shortleaf pine	−	✔	⊖	✔	⊖
Shumard oak	·	✔	●	✔	●
Siberian elm*	·	✔	●	✔	●
Silver linden	·	✔	●	✔	●
Silver maple	·	✔	●	✗	○
Slippery elm	·	✔	●	✔	●
Staghorn sumac	·	✔	●	✗	○
Sugar maple	·	✔	●	✗	○
Swamp white oak	+	✔	▼	✗	⊖
Sweet birch	·	✔	●	✗	○
Sweet cherry	·	✔	●	✗	○
Sweetgum	−	✔	⊖	✔	⊖
Sycamore maple*	·	✔	●	✗	○
Tree of heaven*	+	✔	▼	✗	⊖
Tuliptree	−	✔	⊖	✔	⊖
Virginia pine	−	✔	⊖	✗	△
White ash	−	✔	⊖	✔	⊖
White mulberry*	·	✔	●	✗	○
White oak	−	✔	⊖	✗	△
White poplar	·	✔	●	✔	●
Willow oak	+	✔	▼	✔	▼
Witchhazel	·	✔	●	✗	○
Yellow birch	+	✔	▼	✗	⊖
Yellow buckeye	·	✔	●	✗	○
Yellowwood	+	✔	▼	✔	▼