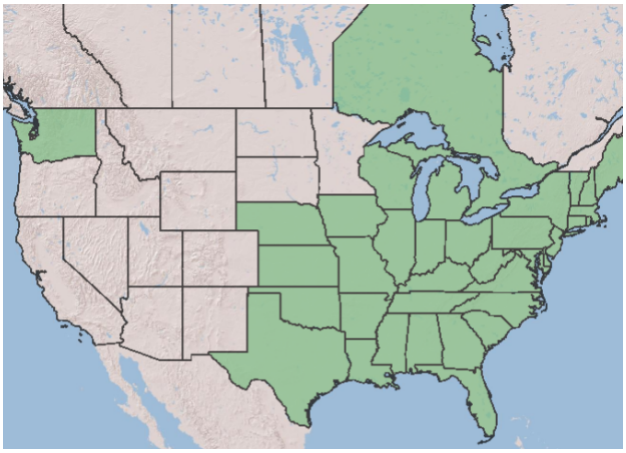
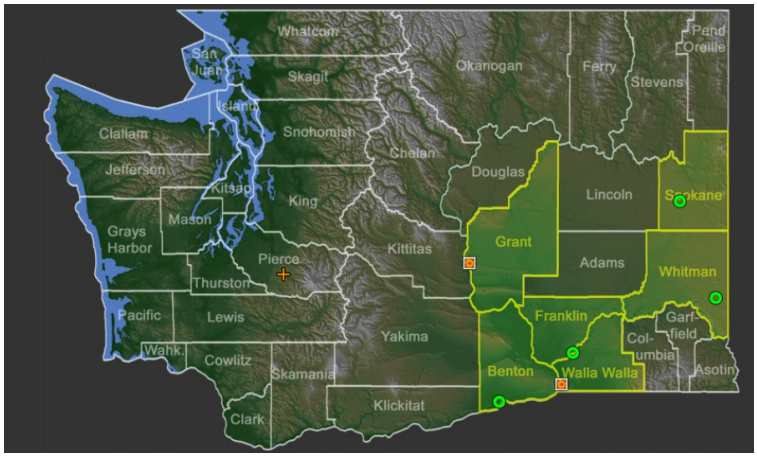
Plant Propagation Protocol for *Platanus occidentalis* L.

ESRM 412 – Native Plant Production

https://courses.washington.edu/esrm412/protocols/2021/PLOC.pdf





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TAXONOMY	
Plant Family	
Scientific Name	Platanaceae
Common Name	Plane-tree family, sycamore family
Species Scientific Name	
Scientific Name	*Plantanus occidentalis* L.
Varieties	[1]No variants are currently recognized although American sycamore does vary geographically.
Sub-species	There are no currently identified subspecies.
Cultivar	There are no currently identified cultivars, aside from commercially bred hybrids with other non-native species.
Common Synonym(s)	[1]*Plantanus occidentalis* var. *glabrata* (Fernald) Sarg. [1]*Platanus occidentalis var. attenuata*
Common Name(s)	[1]Planetree, American planetree, buttonwood, buttonball tree
Species Code (as per USDA Plants database)	PLOC
GENERAL INFORMATION	

Geographical range	[1]*Platanus occidentalis* can be found broadly throughout the eastern United States. It is found as far south as Texas and as northern as Nebraska and Iowa into Wisconsin and southern Ontario, Canada. It was considered invasive in Maine and is no longer present due to extensive suppression and removal. There are reports of it being found in northeastern Mexico as well. [2]In the Pacific Northwest, PLOC occurs along the shorelines and banks of the Columbia River, east of the Cascade Range in central and south-central Washington. It is commonly found in disturbed sites near streams, lakes, ravines, and other most areas. Its absence in eastern Washington is largely attributed to the species intolerance for fire.
Ecological distribution	[1]This species can be found in upland sites in the central area of its range, but it favors fine-grained and fertile soils from floodplains and river beds. Its propensity to grow in bottomland and alluvial soils is characteristic of its adaptation to flooding, but it can be found in a wide range of soils in creek banks, mesic coves and lower slopes. It occupies wet sites such as shallow swamps, slighs, and river bottoms, tolerating soil saturation for up to a third of the year during growing season. The seeds are commonly dispersed via moving water where they are deposited downstream which is extremely beneficial for germination as water recedes after spring flooding. It is commonly associated with other early pioneer or obligate wetland species such as sweet gum, boxelder, silver and red maple, cottonwood, and willows.
Climate and elevation range	[1]PLOC can be found from sea level to 750 feet in elevation in climates that are temperate provided that it is near a body of water to areas with repeat flooding. It is considered a facultative wetland plant in the arid west, Atlantic and Gulf Coastal plain, eastern mountains and Piedmont, Great Plains, Midwest, and

	Northcentral and Northeast (USDA NRCS Plant Guide).
Local habitat and abundance	[1]*Platanus occidentalis* is commonly associated with other early pioneer or obligate wetland species such as sweet gum, black walnut, hackberry, boxelder, silver and red maple, cottonwood, and willows. [2]This species is locally seen through the central region and southern border of Washington state as it's distribution follows the path of the Columbia river. It's precise local abundance is unknown but its conservation status is "Not of concern." Sources vary on the nativity of this species to the Pacific Northwest. Some reports claim the species is non-native, while others propose it was introduced via waterways that carried the achenes from far away. Debates aside, its distribution is highly unusual and important to note. [3]Available data shows that specimens have been as far inland as George, Washington, and as far west as Portland, Oregon.
Plant strategy type / successional stage	[1]American sycamore is a nitrogen-fixing early pioneer species that can be moderately competitive within its range. It can be found in forest types that are pioneer, transitional, subclimax, and climax in succession, and it tends to persist as forests mature. Its tolerance for weeks of flooding makes it a strong contender with other wetland species. If the water is moving or otherwise aerated it can even survive complete submersion of seedlings. During dormancy it can handle up to two months of waterlogged soils but it is less hearty during the growing season where it can only tolerate up to two weeks at a time. If saplings die, however, it still may resprout from the root crown or stumps.
Plant characteristics	[1]This tree is monoecious and deciduous, and it usually flowers within six to seven years of maturity. It is especially long lived with a dense crown. Natural

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stands produce high amounts of seed at 25 years with optimum seed production being reached during 50 to 200 years of age. Maximum age most likely does not exceed 250 years although reports indicate that 500 to 600 years old may be the maximum upper range for individuals under ideal conditions. These trees reach large sizes quickly, with seedlings being up to 10 feet within the first years, and sprouts reaching 25 feet. It has relatively weak limbs that are susceptible to wind and ice damage, and its leaves decay very slowly. PLOC flowers from April to May or even in March in warmer southern climates. Its fruits ripen during the fall in September through November, which fall off as an achene when mature to lay in wait to germinate the following spring.This species can be 60 feet to over 120 feet in height, with a d.b.h. of up to 13 feet. This is the largest known diameter of any temperate hardwood tree.

[1]Identifying features of this species include bark that is patchy and self-exfoliating, with exposed inner bark ranging from brown to yellow to green with older darker bark flaking away in thin brittle sheets. The leaves are alternate and palmately veined. They are up to five inches long and star shaped with three to five sharp lobes. The blades are typically wider than they are long with a truncate to cordate base. The leaves come off of long thin petioles that are nearly as long as the leaves. True to its common name, buttonball tree, the staminate and pistillate flowers are in separate, tightly packed spherical clusters. The resulting fruit is single-seeded and indescient with a tuft of basal hairs attached to each achene to aid in wind and water dispersal. Multiple achenes typically hang pendulously off the tree.

 [5]**© 2009-2020 by John Hilty**	
PROPAGATION DETAILS	
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container
Stock Type	Plug
Time to Grow	[7]8 months
Target Specifications	[7]Individuals should be 3 to 4 feet tall. [8]Underground, the plants should have an established taproot that is extensive enough to have mechanical stability in order to balance top growth.
Propagule Collection Instructions	[8]Collect seeds by hand when dense flower heads have ripen and dried out, but before the anchenes fall off the tree themselves or get blown away by the wind. Depending on region and weather patterns, this will be sometime between September and November just after leaf drop. For large quantities, seeds heads may be collected and shaken out on a canvas sheet. For small lots, the same may be repeated but in a paper bag. [9]The heads may also be separately dried and then crushed to separate the seeds.
Propagule Processing/Propagule Characteristics	[8]Seeds are viable for over a year if stored in the right conditions with a controlled temperature of 50 degrees Fahrenheit and 50 percent humidity. After a year, seeds should be dried to 10 percent to 15 percent moisture

	content and stored in airtight containers from 20 degrees Fahrenheit to 38 degrees Fahrenheit. [6]PLOC seeds average about 200,000 per lbs. Lot purity on average is relatively low since the seeds are accompanied by high amounts of chaf.
Pre-Planting Propagule Treatments	[7]Depending on collection methods and quantities, the fruits may be dried on stacked, ventilated screens to facilitate seed extraction. Seeds may be cleaned with a brush machine followed by a Jesse aspirator to remove fine chaff. The brittle hairs attached to the achenes are a health risk as they break into a fine dust that are an irritant to skin and lungs. [10]Additional methods for cleaning address practical issues such as not being able to bulk clean seeds when genetically different populations must be kept separate. By using a fan,a half bushel of dried heads can yield 6 pounds of cleaned seed in less than an hour and a half. First, seeds are rubbed by hand against a screen of 1/-inch hardware cloth to remove the hairs. As the cleaned seed falls through the screen, a 20- inch window fan draws air through a box to catch the dust and carry it outside. Two sloping baffles deflect the cleaned seed toward the front of the box and onto a collection tray. Second passes may be necessary but one is usually sufficient. [11]An electrostatic speed separator may also be employed to clean the seeds by separating particles of different areas and weights. However, for obvious reasons this method is less practical for smaller operations. [1]The seeds do not need any pretreatment for good germination or to break dormancy. [9]Stored seed must

	be cold stratified for 30 days at 41 degrees before planting but this is not required if not stored. Germination is hindered if they are under heavy litter or in deep shade. They germinate best within 59 and 86 degrees Fahrenheit with germination being delayed outside of those bounds. They require direct sunlight, except perhaps on clay soils. [12]If doing cold storage, one study has shown that chemical treatments before cold storage can produce significantly healthier seedlings with an increase in first year height growth and reduced die-back in PLOC. The seedlings were treated with Liqua Gel, to aid in moisture retention, Vapor Gard, which is an antitranspirant, and two systemic fungicides, benomyl and propiconazole. Sixty-seven to eighty-five percent of seedlings treated chemically before cold storage showed no dieback 20 days after planting. Fifty-nine percent of untreated seedlings had dieback.
Growing Area Preparation / Annual Practices for Perennial Crops	[8]The seeds should be covered with soil, mulch, or sawdust. In different reports, seeds have been planted in media such as Sunshine Mix #1 or #3, or in silty clay loam soil enriched with organic matter. Containers should be 3 gallons in order to accommodate root development during the rapid growth phase before being repotted into a larger container.
Establishment Phase Details	[6]Germination is epigeal. In tests made at temperatures ranging between 23° to 27° C (73° to 810 F), the mean germination under artificial light was 17.5 percent and only 3.1 percent in the dark (21). Seeds failed to germinate in the river-bottom soils of southern Illinois wherever litter was more than 2 inches deep. Sycamore seedlings must have direct light to survive; under favorable conditions they develop a strong, spreading root system and grow rapidly, as much as 91 to 122 cm (36 to 48 in) in height the first year. Roots also penetrate deeper in loess soil than in alluvial or clay soils.

	[7]Sow seeds at the start of spring, ¼ of an inch deep into the soil in a flatbed. They may be broadcast or sown in rows of 6 inches to 8 inches apart.
Length of Establishment Phase	[8]Four weeks after emergence.
Active Growth Phase	[7]Grow in the greenhouse or lath house until the plant is no longer actively growing. During the first year this is typically through the summer and into the first few fall months once the plant begins to harden off. Damping off can be a concern for this species so watch out for it early on and monitor growth. [8]Seedlings that have germinated for at least 5 to 6 weeks can be fertilized during the last week in may. A fertilizer such as ammonium sulfate 21-0-0 may be applied but always irrigate afterwards to prevent foliage burn. Frequency of fertilization depends on the health and vigor of the seedlings for the specific season. Keep soil moist but not fully saturated.
Length of Active Growth Phase	[8]Four to five months.
Hardening Phase	[8]Hardening typically begins in August, at which point fertilizer should no longer be applied and the frequency and duration of irrigation is shortened and applied only as needed.
Length of Hardening Phase	[8]Three months.
Harvesting, Storage and Shipping	[7]Harvest in late fall or early winter. Shipping is best after November once all of the leaves have dropped. Seedlings should be shipped in a refrigerator from 40 degrees fahrenheit to 50 degrees fahrenheit for not more than 2 days ideally. .
Length of Storage	[8]Seedlings may be stored for up to three months and delivered to outplanting sites as late as February or March.
Guidelines for Outplanting / Performance on Typical Sites	[5]Seedlings should be outplanted in an area that ideally receives full sun, although they can tolerate part-shade. [1]As previously mentioned, *Platanus occidentalis* may reach up to 10 feet in the first year and is a long lived

	species that usually takes 6 to 7 years to flower. Once established, this species has high survival rates and remains at sites for decades to come with half a century being early adulthood.
INFORMATION SOURCES	
References	See below
Other Sources Consulted	See below
Protocol Author	Adrian Eric Burres
Date Protocol Created or Updated	05/25/2021

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