

Hybrid Poplars:

Fast-growing, Disease-resistant Species Has Multiple Uses

The production of alternative fuels as a source of energy is a focus of concern in the United States. Intensively cultured hybrid poplar plantations have been used to supplement industrial fiber supplies in several areas of the United States, and have therefore gained attention in the North Central region. Attention is focused on hybrid poplars because they are fast growing in this region. In addition, an increase in Conservation Reserve Program (CRP) lands enhances the opportunity for Tree Farmers to convert fallow marginal land into fiber-rich tree plantations in short time.

Hybrid poplars are not only used as a source of alternative fuels and fiber. Tree Farmers may find hybrid poplars important for windbreaks. Municipal institutions may find hybrid poplars significant for phytoremediation efforts.

The list of what hybrid poplars can do for Tree Farmers is endless, so researchers have devoted considerable time and effort in breeding and selecting fast-growing, disease-resistant hybrid poplar clones suitable to the North Central region's climate. Hybrid poplar clones are being examined because vegetative reproduction is easy and efficient compared to other tree species in this region. Furthermore, the genetics of the clones are relatively easily altered.

What is a Hybrid Poplar?

A hybrid poplar is a tree that is hybridized naturally or artificially through controlled crossing of various poplar species. Hybrid poplars belong to the genus *Populus*. Three common examples of species belonging to *Populus* are eastern cottonwood (*Populus deltoides*), European black poplar (*Populus nigra*), and western black cottonwood (*Populus trichocarpa*). Researchers "make" a hybrid poplar by combining two members of *Populus* into a new hybrid. For example, DN5 is one commercially available hybrid poplar clone. DN5 is a hybrid wherein *Populus deltoides* is crossed (combined) with *Populus nigra*. Thus, this hybrid poplar clone is an offspring of eastern cottonwood and European black poplar parents, just as a tiger musky is a cross between a musky and a northern pike.

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Photos by Ed Bauer



Breeding orchard of hybrid poplar in northern Wisconsin during its fourth growing season.



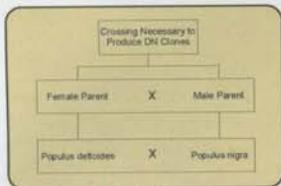
Fallow marginal farmland (upper photograph) and harvest of a hybrid poplar planting at rotation age (12 years).



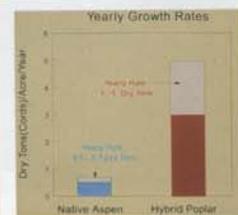
Hybrid poplar planting late during the first growing season in Wisconsin.



Breeding scheme showing percentage of DN clones of hybrid poplar; similar crosses are used for other clones.



Growth rate of hybrid poplar versus native aspen in the Lake States.



Hybrid poplar cutting less than one week after planting shows two shoots above the surface of the soil.

Why Hybrid Poplars?

Hybrid poplars are desirable for Tree Farmers for a number of reasons:

1. Hybrid poplars may grow approximately six to ten times faster than native aspen (*Populus tremuloides*). This increased growth rate allows the Tree Farmer to see economic returns from the trees in 10-12 years, compared to 40-45 years with native aspen (stumpage prices may exceed \$30 per cord). Enhanced growth also increases aesthetic returns, as the hybrid poplars may grow 3 or 4 meters tall in as little as two growing seasons.
2. Hybrid poplar research is conducted to eliminate disease problems. Weeding out young hybrid poplar clones that are not relatively disease resistant enhances the opportunity for commercially available disease-resistant trees.

3. Research of *Populus* has been conducted for hundreds of years. Thus, there is a wealth of knowledge concerning genetic manipulation of these trees.

4. Hybrid poplars are very easy to plant. Unlike a number of other tree species, hybrid poplars may be planted as unrooted dormant hardwood cuttings. The planter must simply shove the "stick" in the ground. Ideally, these cuttings are 10 inches in length and have a primary bud located at the top of the cutting. No more than two inches of the cutting should be exposed after planting.

5. Although the trees must be kept weed-free with adequate moisture for three or four growing seasons, the hybrid poplars require minimal maintenance for the rest of the rotation (10-12 years) because the trees shade out weeds and other competition.

6. Due to coppice growth — growth resulting from sprouting off of the existing stump — the trees must not be replanted after they are harvested. In the long run, this saves the Tree Farmer planting and site preparation costs.

Primary Uses of Hybrid Poplar

Pulpwood — Increasing human population in the Lake States has increased consumption of native aspen used for the production of wood products. Therefore, it is projected that demand for such wood will exceed supply within 20 years. Hybrid poplars provide Tree Farmers an opportunity to combat this deficit of wood supply. Due to fast growth rates, hybrid poplars may be substituted for native aspen on a large scale.

Engineered Lumber Products — Hybrid poplar is and will continue to be used for engineered lumber products such as oriented strand board because growth rates manifest larger trees in

shorter amounts of time compared to native aspen. In addition, chips of hybrid poplar are also used for poultry bedding. Contrary to the belief of many, some hybrid poplar clones are as structurally sound as native aspen. Thus, hybrid poplar may also be used for I-beams and other structural lumber for construction.

Energy (Biomass for Electricity) — Hybrid poplars are very appealing for the production of energy because burning wood does not increase the amount of atmospheric carbon monoxide, a harmful greenhouse gas. Instead, the amount of carbon monoxide absorbed during the life of the trees mitigates the amount of carbon monoxide given off. Tree Farmers should not overlook the possibility of growing hybrid poplars for energy. Of approximately 60,000 acres of hybrid poplar in Minnesota, just under half (27,000 acres) is for energy production.

Cordwood — Producing hybrid poplars for firewood is very important for landowners, who may otherwise purchase their firewood because they do not want to cut down middle-to old-aged trees on their land. Hybrid poplars offer the opportunity to harvest large trees without waiting extended periods of time for the trees to grow.

Alternate Uses of Hybrid Poplar

Riparian Stabilization — Many Tree Farmers have streams or rivers running through their land. Oftentimes as a result of natural water-level fluctuations or human caused impacts streambanks erode into the water. Soil erosion also occurs when agricultural lands are adjacent waterways, without some type of forest buffer to reduce sediment flow into the water. Hybrid poplars planted along waterways help to stabilize streambanks and filter sediment flow from adjacent agricultural lands. These riparian buffers also provide additional wildlife habitat. Keeping waterways free of sedimentation is



Hybrid poplar planting late during the second growing season shows intensive weed control.



Hybrid poplar planting at rotation age (12 years) in Minnesota.

important for water quality and aquatic wildlife.

Agroforestry — In this case, agroforestry is defined as a practice whereby hybrid poplars are combined with livestock or annual crops. Combining hybrid poplars with livestock falls under the conventional system of silvopasture. For example, a Tree Farmer may plant hybrid poplar then allow cattle to graze the understory vegetation. The Tree Farmer is thus able to produce high-value timber while getting short-term cash flow from the livestock. Also, health of the livestock is enhanced because the trees reduce wind chill during winter and provide shade during summer. This system may also increase wildlife diversity and water quality. Furthermore, combining hybrid poplars with annual crops is an example of an agrisilviculture system. Just as with the above silvopasture system, annual crops will provide the Tree Farmer with short-term economic returns while the quality trees provide long-term cash flow. In addition, the trees act as a windbreak, protecting the annual crops from strong winds and other extreme weather conditions.

Windbreaks — Windbreaks, as protective rows of hybrid poplars, are important for all landowners. Excessive winds that caused the dust bowl of the 1930s prompted many landowners in the southern and central United States to plant windbreaks to reduce erosion of land and damage to homesteads. Present landowners may not experience winds as extensive as during the dirty '30s, but the need for windbreaks is nonetheless apparent. Homestead windbreaks

located around the home and other buildings contribute to lower heat losses (and heating bills!) along with a reduction in snow removal needs because snowdrifts are minimized. Livestock windbreaks lower the windchill factor, thereby increasing animal health and feed efficiency. Field windbreaks reduce soil erosion and water runoff into nearby waterways. Landowners also benefit from windbreaks because of increased wildlife habitat and the enhancement of the picturesque appearance of their land.

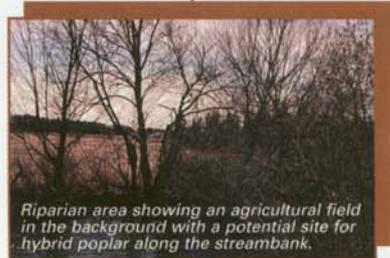
Phytoremediation — The amount of human waste produced has greatly increased in past decades. Thus, landfills and dump sites are oftentimes filled with more waste than is environmentally safe. Something must be done to reduce harmful products infiltrating into the soil and nearby groundwater. Hybrid poplars are a potential answer to this problem. Although phytoremediation efforts using hybrid poplars appear to be very beneficial, much research is still needed. Nonetheless, hybrid poplars stabilize soil (reducing erosion), take up harmful waste products and provide scenic beauty to otherwise unattractive landscapes.

Considering Hybrid Poplars

It goes without saying that hybrid poplars are not the cure-all for wood shortages and environmental problems. Nevertheless, hybrid poplars offer Tree Farmers many characteristics to enhance their land investment. Some may desire hybrid poplars for a riparian buffer strip used for streambank stabilization. Others may plant hybrid poplars with intentions of growing fiber for steadfast economic returns within 12



Engineered lumber products made from hybrid poplar.



Riparian area showing an agricultural field in the background with a potential site for hybrid poplar along the streambank.



Agrisilviculture system in southern Wisconsin shows alternating rows of hybrid poplar with cultivated soil that will be planted to agricultural crops such as corn or soybeans.

years. Still other Tree Farmers may simply want to plant hybrid poplars as windbreaks to reduce heating costs.

Hybrid poplars are a tree species that provides multiple benefits without waiting and waiting and waiting. It truly serves as a multi-purpose tree for Tree Farmers. 🌿

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