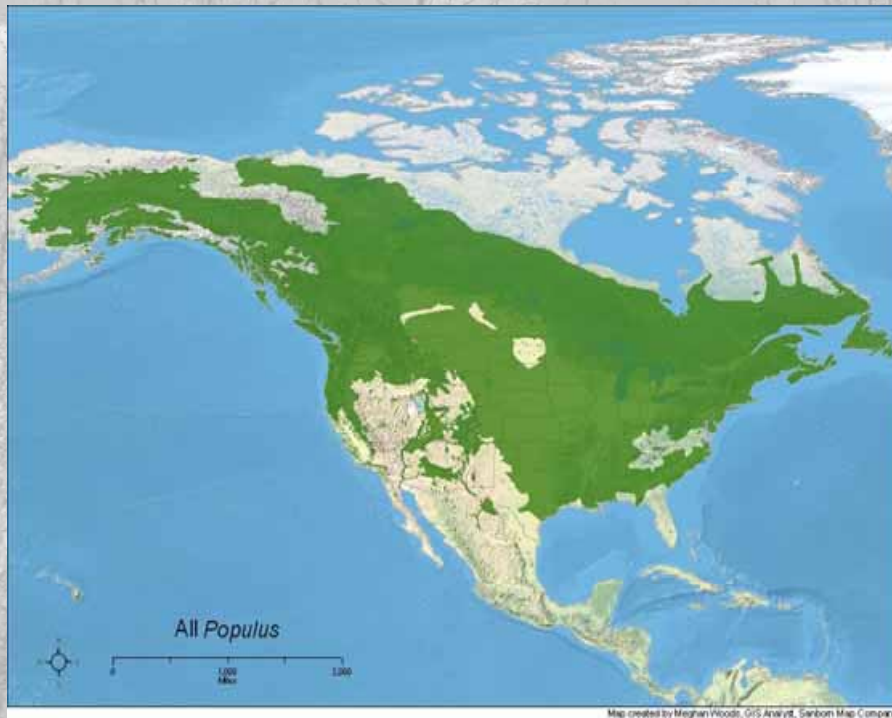
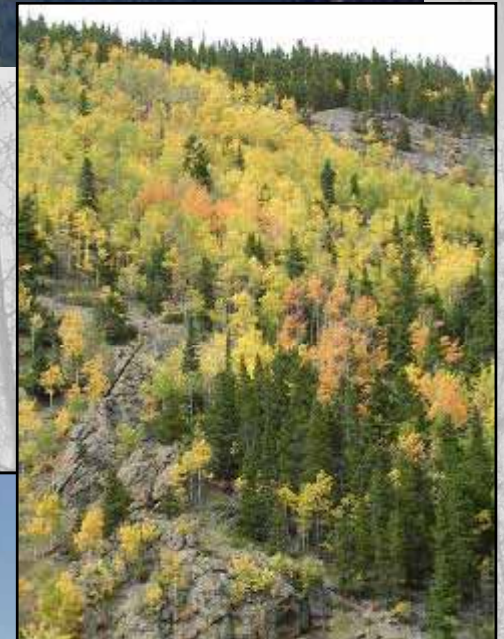


# *Populus* (poplars, aspens, cottonwoods)

- Distributed throughout the N. hemisphere
- ~30 species



# Worldwide, poplar culture relies on hybrids of 8 species

## U.S. programs

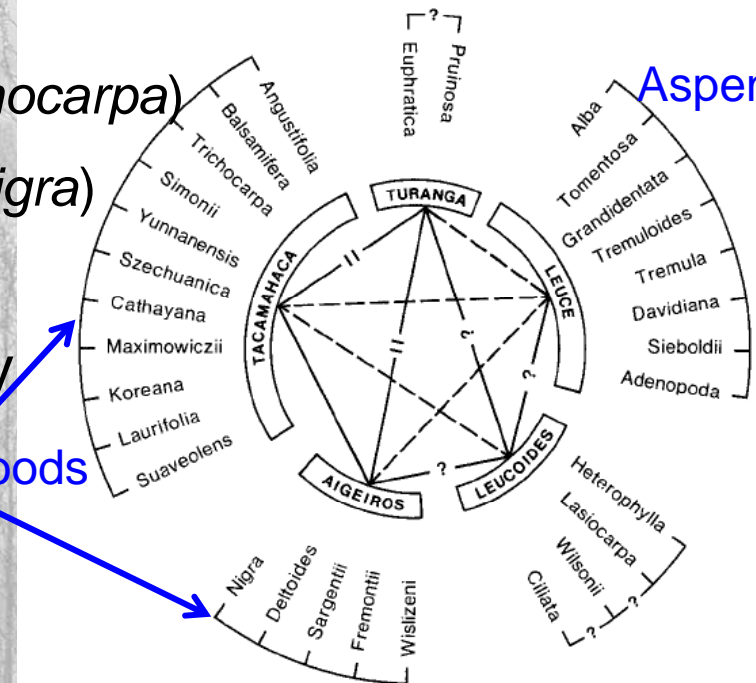
- *Populus trichocarpa* (Black cottonwood)
- *Populus deltoides* (Eastern cottonwood)
- *Populus nigra* (Black poplar)
- *Populus maximowiczii* (Asian poplar)

## Hybrid combinations

- *P. x generosa* (*P. deltoides* x *P. trichocarpa*)
- *P. x canadensis* (*P. deltoides* x *P. nigra*)
- *P. deltoides* x *P. maximowiczii*
- Can rapidly scale up a single variety
  - 1 million clones in a few years

Cottonwoods

Aspens



# Versatile Crop

- Pulp
- Solid wood products
- Dedicated energy feedstock
  - 2,200 stems/acre for 2-year coppiced rotations
- Environmental remediation



# Current Poplar Plantation Acreage

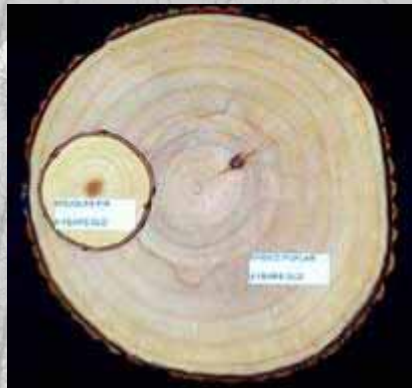
- Europe: 2.8 million acres
- China: 1.9 million acres
- USA: 84,500 acres
  - Lower Mississippi River Valley
  - Central/North Central
  - Pacific Northwest
- Canada: 27,223 acres



# Poplar growth

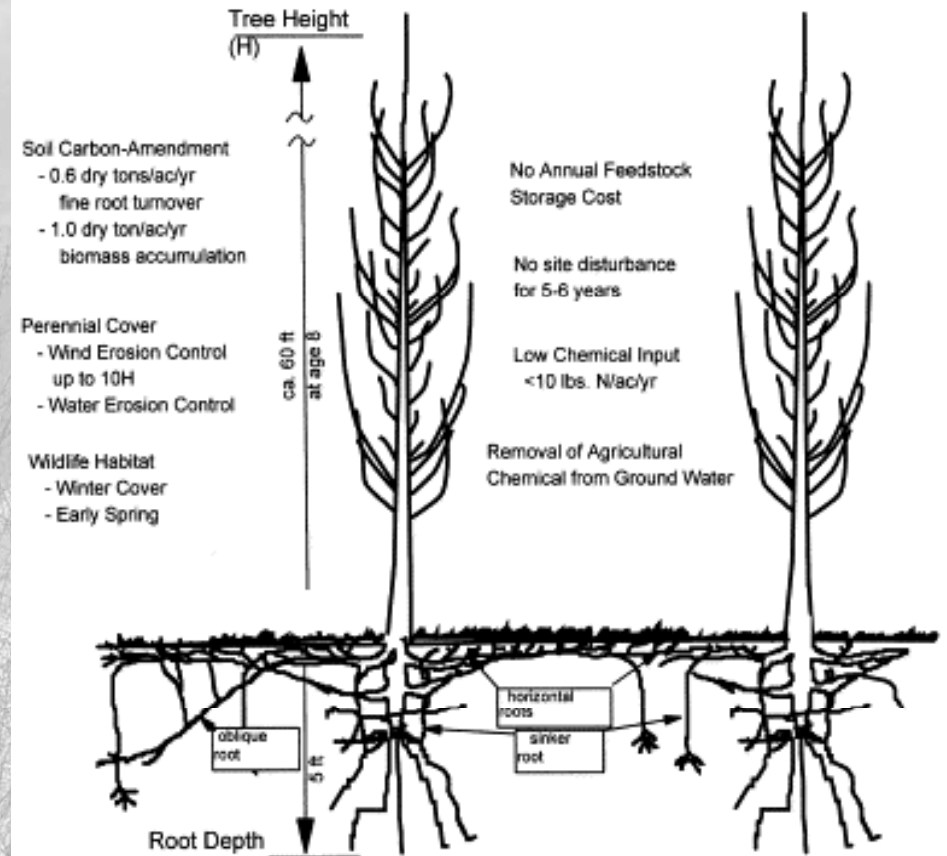
- Can reach 60 ft in 6 years

*P. x generosa* clone 15-29



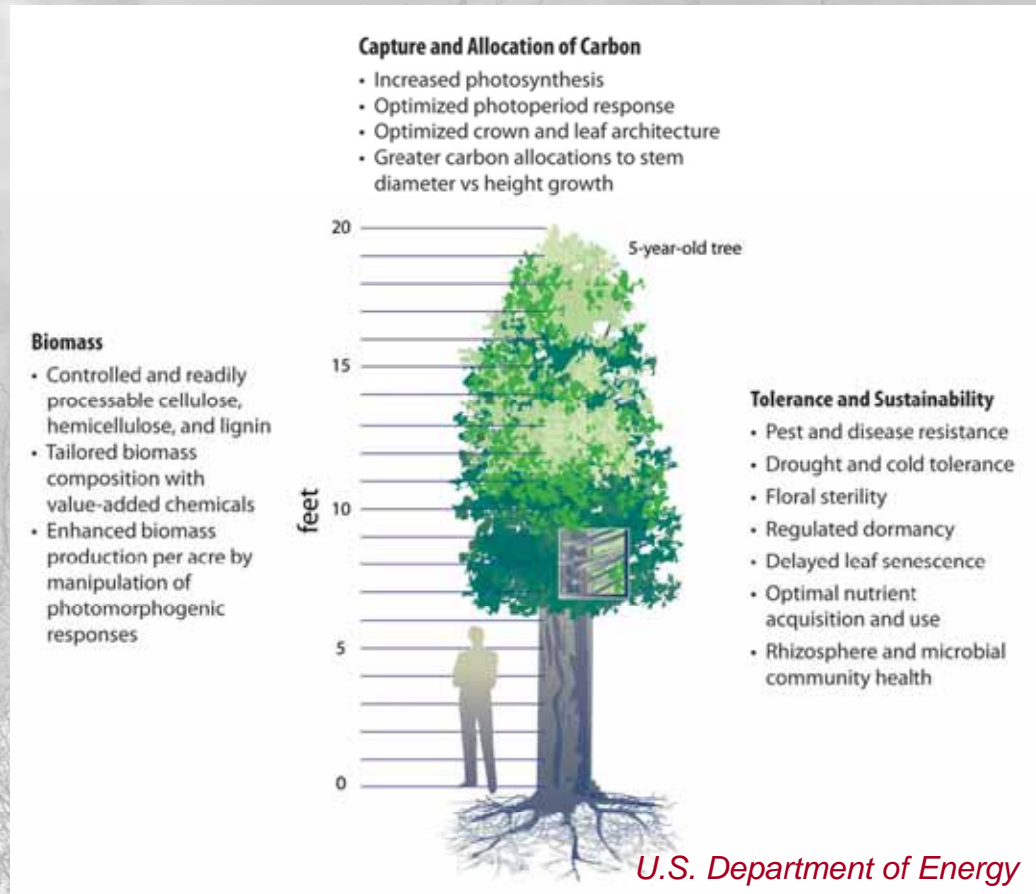
# Poplar as U.S. Bioenergy Crop: The Beginning

- 1973: OPEC oil embargo
- 1977: DOE Biomass Feedstock Development Program
  - Perennial crop focus
  - 1978: Poplar and other woody crop research
  - 1992: Poplar chosen as model energy crop



Tuskan 1999

- Energy crops need to be developed & tested regionally
- Development of Poplar for Virginia
  - Leverage experience & genetic resources developed elsewhere
- Accelerated domestication for biomass production



# Rapid domestication approach can radically change relationship between cost & yield of energy crops

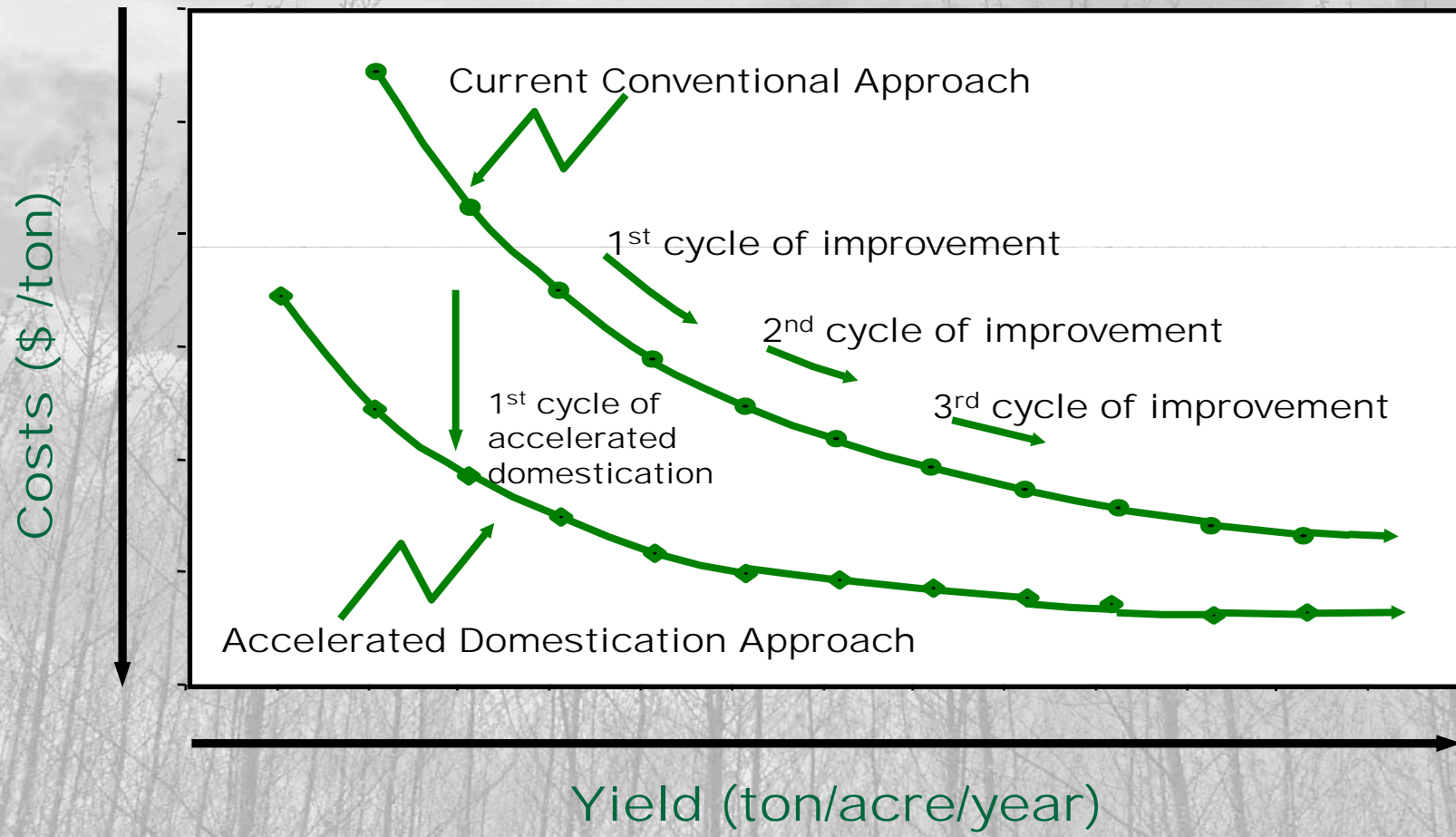


Figure credit: Oak Ridge National Lab

# Popular molecular tools & genomic resources developed—needed for rapid domestication

