

MATACF Annual Meeting November 19, 2006

Board Members Present: Brad Smith, Yvonne Federowicz, Kathy Desjardin, Rufin Van Bossuyt, Charlotte Zampini, John Mirick, Mike Meixsell, Guy Shephard, Mike Novack, Frank Howard (more came after meeting opened)

10:41 Meeting Opened

Motion to increase size of board by one (Brad) Seconded (Frank)
Passed Unanimously.

Election: ballots handed out
Results: Everyone re-elected; Bruce Spencer Added.

Other issues: Worcester Land Trust rep may come today, interested in demonstration planting.

Meeting adjourned.

Welcome and MA Chapter Roundup– Brad Smith, President MATACFs

2006 Highlights:
18 unique Clapper lines
19 unique Graves lines

MATACF now has 26 orchards with 5000+ trees

Program described for newcomers

Gordon Bliss, owner of facility, described Chestnut Room at Blissful Meadows Golf Club.

Chestnut wood is over 125 years old; room is beautiful, all enjoyed viewing. Most of room chestnut. Natural chestnut wood – unstained - color varies from light honey to deep mahogany. Wood was reused from old barn structure on property. Lumber was right from this farm.

Annual Meeting Update: Rufin.

From National TACF meeting in Meadowview, VA.

Leila:back cross breeding 101.

Leila's role – whatever can help the New England state chapters. Will help MA next year with inoculations.

USDA – Office of Forest Pathology. Founded in 1922.

Sleeping Giant Plantation.

Both wanted a timber-form chestnut, weren't as interested in "Americanness".

USDA & CT AG station – mostly creating F1s. Best could only be moderately resistant.

Were crossing F1s back with Chinese; were resistance but had non-timber form. Dr.

Sandra A. was leading ?

400 lbs N/acre... Fred gets good growth...

Talk by Professor Charlotte Zampini, Board Member and Vice President of MATACF

Why is diversity important:

Used to define taxonomic groups

Infer evolutionary history

Predict evolutionary potential

Traditional taxonomy uses anatomy morphology and biochemistry to group organisms with ?

- Qualitative not quant
- -Easily scored
- - Invariant (leaf hairs – sun vs shade)
- - Species spec
- - Independent

Castanea dentata, *mollissima*, *crenata*, *sativa*, *pumila*

Leaf shapes change dep. Upon conditions

(tree id reviewed)

Individual trees have lots of variation

Hair type – glandular – differs across spp.

Why is precise id sometimes difficult?

Variation due to env., young vs. old, space, open vs. middle of forest, sun v. shade

Natural hybridization – chinkapin and chestnut

Human activity – Chinese importation, Japanese. Chinese – mid 1800s

Overlap in traits exhibited by related sp

Mode of inheritance of specific traits

Natural genetic variation within spp

Current model – 3 blight resistance genes plus others that modify it

Common ancestor

There is no one universally accepted Species Concept in plant biology

- differences on which types of traits to use

Six different major spp concepts

Phylogenies reviewed

Molecular characters are now widely used to construct phylogenies

- proteins (enzymes/allozymes)
- DNA (coding sequences)
- Non-coding sequences or neutral markers
- RAPDs, SSRs, AFLPs

DNA variation and gene trees

-different parts of the genome evolve at different rates

Non-coding regions generally evolve and accumulate DNA variation at a faster rate than coding

Strong natural selection at a specific gene locus will cause it to evolve at a different rate than a neutral locus

DNA gel electrophoresis used

How similar genetically are American and Chinese chestnut spp.?

Isozyme data indicate 10-13 myr bp divergence time; genetic identity of .5

DNA hybridization: how much DNA shared? "strong hybridization" between American and Chinese DNA

3 backcrosses – 94% American; but share 50% already; now only a few % will be different

What is appearance of the BC3 generation

Extremely difficult or impossible to distinguish most BC2 and 3 from American

Matt Diskin at PSU measured 24 morphometric characteristics

What do we call the product of the backcross breeding effort?

Charlotte feels should be called American chestnut

Preserving genetic variation and evolutionary potential

Environments change over time

Genetic variation is the essential for adaptation to new environments and long term spp survival

Lack of genetic variation has been correlated with increased prob. Of extinction in a wide variety of spp

Small pops of normally outcrossing spp mating among relatives leads to inbreeding depression and reduced survival

What does molecular data reveal about genetic diversity in the American chestnut? What does this tell us?

High levels of diversity in noncoding regions

Enzyme variation average compared to ecologically similar spp but lower than in related chestnut spp

Most of variation in both types of markers occurs with local popns, however, a significant proportion also exists among popns

Knowledge of variation in genes controlling adaptive traits is relatively scarce, and it may be very distributed

Is there evidence of genetic variation in adaptive traits in chestnut?

Unfortunately not much resistance to blight, but some

Meadowview have some resistance genes (modifier genes)

Not enough on its own though, needs Chinese

Evidence of genetic variation in:

Sudden oak death

Ink disease, gypsy moths etc

Cold tolerance

Growth rate

Seed size, color, dormancy

Soil types

Mycorrhizal associations

Timing of bud break

Flowering time and duration

Self-incompatibility alleles – need 2 genetically different trees to set seed – single gene locus

1-10% nuts self-produced

Variation in bark thickness

Talk by Bruce Spencer – chief forester from MDC watershed division and new MATACF Board Member

Planting hardwoods in Quabbin

Had been in Galicia, Spain – Romans brought chestnut in to feed slaves, more protein, forest today

Hickory and sugar maple stands in Quabbin today

Why plant oak seedlings in an oak forest?

DEER

Deer habitat created in early 1900s, then '38 hurricane blew things down, more deer 24,000 acres but deer population massive, devour understory

Deer population 200/sqmi crashed to 30 sqmi – carrying capacity would be greater for deer, but not there

Some plantations – only hayscented fern in understory deer can't eat
Having deer hunt – plants vs animal rights. Changed state law.
Oak regeneration needs to be well established to compete with other trees.

First started with seedlings; shovel, hard to get into ground. Couldn't compete.
Nurseries started to grow smaller seedlings – black birch outcompeted.

Cut tap roots of oak seedlings – get broad base of roots – acts like an old understory tree with a good root system. Grows very rapidly.
Techniques for planting – got pros from south. Tool – hoe??dad Seedling planting – very good. Makes vertical hole.

Oaks were able to compete.
Hired others to plant, not always successful because didn't do carefully. Don't plant next to sprouting stumps, don't leave air around roots etc.

Prune extra-long seedling roots. Deep taproots bad – hard to plant.
Plant in openings, not near edges, root systems from trees. Good soils. Deer serious problem.
Noted that chestnut seedlings had nice root systems. Dense. Put into old pine areas – grey birches would be there. Chestnuts had no problem competing with birches – outgrew everything.

One year, cut, had a good seed year. Oaks were 18 inches in cull sun by end of year.
Now, use float test, Plant acorns.
Oaks cannot compare to chestnut in growth – outgrows even black birch.
Bruce happy to start planting chestnuts in forest. Will keep track of.

Mostly are planting where hemlocks died from adelgid. Pine – oak – hemlock – chestnut

Openings available for chestnut are in mixed stands, partly cleared from dead hemlock

Keynote Talk by Professor Emeritus Thompson Webb III, Brown University

Trained in biology. As an eight grader, went to west, wanted to become a vertebrate paleontologist. Started in Swarthmore as biology. Botanists had best field trips. Mammals nocturnal, couldn't find them. Convenient set of organisms. Worked in U. Wisc. With meteorologist who was interested in past climates. Studied with pollen person. Went back to Wisc. For grad training in meteorology and climatology.

Pollen for him showed changing composition from spruce to current compositions. Could use that to show changes in climate.

Buy some land off FL and will have nice beachfront property during ice age.

Showed ice sheet – Pollen viewer.

Ice sheets were depressing land, rises afterward. Then coastline changes as center rebounds up.

Down in Virginias are where first appear.

Chestnut pollen is underrepresented in pollen record. Attempts to do pollen with leaves on. Oaks and maples pollenate without leaves. Chestnut does with leaves. Trees can move into area before pollen actually shows up.

Probably were around in more sites before they picked up pollen presence in the sites they looked at.

Chestnut were there in southern Appalachians. Not on coast, wanted to be in Appalachians. Oaks and hickories were lower level. Hemlock and chestnut and ? more in mountains. Still southern appalachians by 8k bp. 6k yrs bp getting more prevalant, beginning to spread out.

By 4k into New England a bit. 2K into MA area abundantly. 4% 1K bp. Pre-European 500 years bp. – most area. Modern – blight, cutting.

Blight is a great marker to show about the year 1920 in pollen record. Then in some places –

Hemlock moves up Appalachians. 5200 yrs bp hemlocks were hit by a blight – took it virtually all out. Drought stress. Within 300 yrs. Knocked out. Revived slowly about 3k yrs b.

Tropical plants mostly insect-pollinated – not many grains to work with. Hemlock is only one in all that time.. Rate much lower of disease epidemics.

Chestnut, elm, hemlocks, beech scale,

Chestnut in the context of late quaternary vegetation change in North America.

Students were several on maps, more than 500 over last 50 years.

Wind pollination is very inefficient – most ends up not pollinating. Lake bottom sediments.

Spruce to white pine to hemlock to beech to hickory to hemlock.

Some very low levels of chestnut all the way back to 12k bp.

1% contour of beech goes beyond range boundary. Chestnut pollen is inside range of chestnut. Shows that chestnut underrepresented.

Had hung out in New England for a long time in low density until climate right. Migration may have been much earlier than its rise to abundance.

Ragweed brought in by Europeans – another stratigraphic indicator of landscape clearance and agriculture. Prairie forbs with ambrosia and without ambrosia...

Forestry practices radically altered spp over last few hundred years.

Prairie replaces elms eastward from 10k to 7 K

New England getting wetter over this time, beech and hemlock. Prairie Midwest getting drier with elms disappearing, prairie coming in. Shower climate change.

Fir at 13k similar to chestnut 500 yrs ago. Moisture but colder then. (Both want moisture and stayed in mountains.)

Tree taxons that take on similar distributions at differing temps...

Some basins show water levels. High, low, intermediate.

East coast was dry in 10k, comes up to intermediate. Southeast that was low comes up to high. Midwest High to low, ragweed moves in.

The water levels match the plant findings.

Stable isotope levels – way to get temp.

Goes from cold to cool, warm then gradual cooling. High moderate water in New England and cooler also favored chestnut.

Chestnut had preferred Appalachians, had come down when moisture and cooler lowland.

If flowers right over water basin, about 20% chestnut 2400 yrs bp. Oscillate. Some C3.