American Chestnut Planting Practices

Site Selection, Preparation and Planting

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SITE SELECTION

CONSIDERATIONS FOR SELECTING THE RIGHT SITE FOR AMERICAN CHESTNUT

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Site Selection

- Type of site selected could be:
  - Field
  - Forested –
    - Recent clear-cut
    - Shelter wood
    - Regneration
    - Other
  - Highly disturbed site –
    - Mine reclamation

Site Selection

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Field

- Good access to light
- No clearing necessary
- Turf and other vegetation to manage
- Lack of beneficial mycorrhizae likely

Forested

- Light availability dependent on level of clearing
- Often little understory vegetation to manage
- Beneficial mycorrhizae present
- Interaction with forest

Soils

- Soils appropriate to chestnut are:
  - Well-drained
    - Drainage
    - Saturated hydraulic conductivity
  - Slightly acidic
    - Soil pH of 4.5-5.5

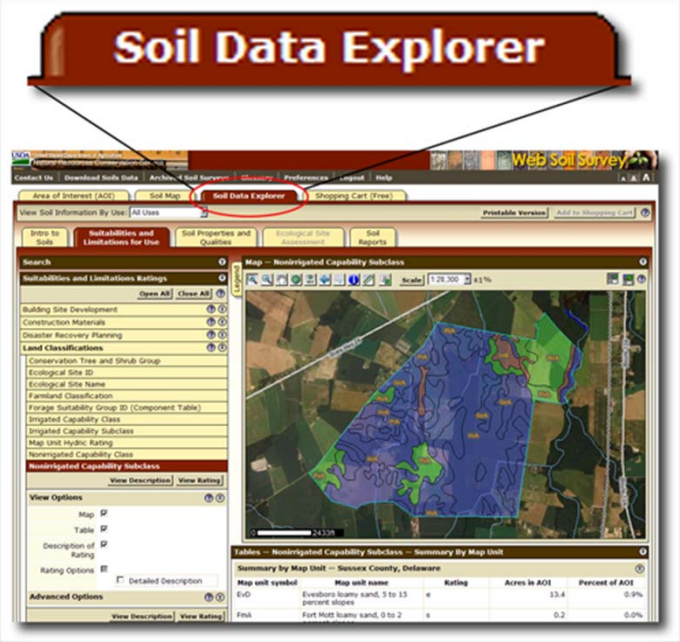
http://en.wikipedia.org/wiki/File:Kalmia_latifolia_species.jpg

http://en.wikipedia.org/wiki/File:Blueberries-Littleisland.jpg

Ericaceous plants, like mountain laurel and blueberries, are good indicators of acidic soils, though a soil sample is the best way to know for sure.

Soils

- A soil test is the best way to determine soil pH and learn more about the nutrient components
  - Most land-grant Universities offer soil testing for a minimal fee
  - Select blueberries or Christmas trees as the crop being grown, unless you know chestnut-specific recommendations are available
- Use NRCS's Web Soil Survey to look at the site in question
  - Explore many soil properties
    - Hydrology, changes in soil type, etc
  - Download results to keep on-file



http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Soils

- Possible soil issues to look out for:
  - Compaction
    - **Check land-use history**
    - Old log landings
    - Previous construction
  - Ledge/depth to bedrock
    - Roots need room to grow
    - Depth to bedrock: 4-6 feet minimum
  - Fragipan
    - Subsurface soil layer
    - Restricts flow of water and root penetration
    - Bx or Btx in soil descriptions

Empty up-hill rows were planted over ledge. Chestnuts sprouted but quickly died.

Soils

- Land-use history can be very important during site selection:
  - Compaction from pasture, old log landings or construction work
  - Nutrient levels – either high or low – from previous agricultural practice
  - On-site accidents or spills could leave behind toxins
- Best to know what happened in the past to identify any potential issues early on

http://en.wikipedia.org/wiki/File:290X2Forestry.JPG

Microclimate

- Microclimates are areas with climates differing from the surrounding area:
  - Warmer/colder
  - Wetter/drier
  - More/less prone to frost
- Can be large or small
- Look for:
  - Cold valleys
  - Large bodies of water
  - Topography

Local knowledge can help identify on-site microclimates

http://en.wikipedia.org/wiki/File:Frost_on_a_nettle,_Netherlands.jpg

Site Preparation

Planning For Planting

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Site Preparation

Begin planning for a planting at least one year in advance

It can take careful planning to prepare an orchard site

- Develop a timeline
  - Identify site preparations needed and target dates for completion
- Develop a budget
  - Research options and begin purchasing materials
- Work on time-consuming projects like:
  - Pricing/planning for deer fencing
  - Extensive clearing or pre-planting vegetation management
  - Experimental design or planting layout

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Site Preparation

Vegetation management can be a big part of site preparation

Identify any invasive species early on - these will be the most difficult to remove and control

- Forest site prep:
  - Large existing vegetation to remove/manage
  - Clearing, stumping, rock removal
- Field site prep:
  - Herbaceous vegetation to remove/manage
  - Herbicide, black plastic, landscape fabric, mulch

Pre-planting row cover can help kill vegetation prior to planting.

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Site Preparation

Soils should be a big consideration when selecting a site

A soil test is the best way to confirm that the soils on-site are appropriate for growing chestnut

- Your soil test results should include recommendations for your crop
- Follow site preparation and management recommendations, some of which are best done 6-12 months before planting
  - Soil amendments
    - Adjust the soil nutrition or pH to be most beneficial to growing chestnut
  - Fertilization plan
    - Use the on-site soil nutrition to develop an appropriate fertilization plan

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PLANTING

RECOMMENDATIONS FOR INSTALLING AND MANAGING YOUR CHESTNUT PLANTING

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Soil Preparation

- There are many ways to prepare the soil for planting
- Soil preparation will depend on the site and equipment available
- Field sites:
  - Big equipment: plowing, disking or use of a soil auger/post hole digger
  - Hand equipment: hand digging, bulb planter, dibble bar
- Forested or rocky sites:
  - Big equipment may be more difficult to use
  - Hand equipment: hand digging, bulb planter, dibble bar

Planting Supplies

- A weed-free planting mix is often used
  - Reduces competition
  - Provides more balanced moisture
- Recommended planting mixes include:
  - 1/3 each peat, perlite and vermiculite
  - Scott's Miracle-Gro® Moisture Control ® Potting Mix
  - Sun Gro® Metro-Mix® 560 SUN-COIR
- Including a small amount of forest soil may contribute beneficial mycorrhizae
  - Most important in field sites where beneficial mycorrhizae are less likely to be present

Planting Supplies

Shelters provide important protection against wildlife

- Select shelters based on the expected wildlife pressure
  - The shorter the shelter, the better
  - Tall shelters prevent trees from forming reactionary wood
- Many options for 18-24" shelters
  - TREE PRO, Tubex, Blue-X ®
  - Make your own – flashing, mesh, etc
- Sink shelters ~2" to protect the base of the trees
- Deer protection may best be provided by fencing
  - 8-feet – woven wire, electric, etc

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Planting Supplies

- Stakes may be needed to secure shelters in place or mark the location of trees
- Wooden stakes are the easiest to find but do need to be replaced over time
- Options include:
  - Hardwood
  - Pine
  - Bamboo
  - Fiberglass
  - Metal

A post-pounder is a handy tool for installing stakes.

http://en.wikipedia.org/wiki/File:Tpost1.jpg

Planting Supplies

- Many vegetation management plans involve the use of some type of physical barrier
  - Often in addition to, or replacement of, herbicide
  - Can encourage rodents/voles – be mindful
- Landscape fabric
  - Woven fabric or plastic
  - Heavy-duty is best for long-term durability
  - Can be run down rows or around individual trees (competition mats)
- Mulch (if using)
  - Around individual trees is best
  - Most attractive to rodents/voles

Planting Supplies

- Whether nuts or seedlings, make sure all sources are clearly labeled
- Nuts
  - Most common way to plant
  - Store somewhere cool until ready to put in the ground
- Seedlings – could be bare-root or potted
  - Bare-root seedlings require special care to make sure they do not dry out before planting

Remember: you can't plant much without the chestnuts!

Tracking the Planting

You will need:

Transparency grid: write on the shiny side ONLY

Dry-erase marker

- Activity Break: Layout a Planting
- The grid represents your site's available planting space. Your planting should include the following:
  - 23 trees from Line 1 (1)
  - 23 trees from Line 2 (2)
  - 6 American chestnuts (A)
  - 6 Chinese chestnuts (C)
  - 6 F1 hybrid chestnuts (F1)
- Using a dry erase marker, place the appropriate number of symbols for each type of tree in the planting spaces.

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Tracking the Planting

- It is important to randomize your chestnut planting
  - Often planting several sources of interest
  - Sources planted together may suffer from a local site issue or other geographically-oriented stressor (remember the activity?)
- Randomization also reduces site effect on performance
  - Genetic x Environment (G x E) interaction
  - Allows for a better snapshot of blight-resistance
  - Performance of an entire line not dependent on potential stress (or lack of stress) in one part of the planting

Tracking the Planting

- Chestnut plantings usually include several different crosses or species
  - Need a way to distinguish what goes where on the ground
  - Especially important with a large group of planters
- A color-coded layout works well
  - Plastic flags
  - Painted/colored stakes
- Can be done pre-planting or on planting day
  - If time to do prior to planting, this is a great prep task

http://www.forestry-suppliers.com/product_pages/View_Catalog_Page.asp?mi=1115&title=Plain+Vinyl+Stake+Wire+Flags#

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  - Mo
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- Map
  - Pre
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    - M

Wigwam Brook Orchard
John Baker and Tom Traver
Row 1 starts in the South-East corner, along the beaver dam/wetland

Blue Bird Box

N

Position	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Position
38	CT-WL087 x HE367 BC4	VCE x OP Ch Chinese	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling								38
37	VT-CC006 x op Am American Seedling (888)	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	VCE x OP Ch Chinese	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling							Blue Bird Box	37
36	CT-WL087 x HE367 BC4	CT-WA088 x HE155 BC4	Hu97-13 x Palmyra F1	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								36
35	VT-CC006 x op Am American Seedling	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling	CT-WL087 x HE367 BC4								35
34	CT-WL087 x HE367 BC4 (888)	Hu97-13 x Palmyra F1	VCE x OP Ch Chinese	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4							Blue Bird Box	34
33	VCE x OP Ch Chinese	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling	Hu97-13 x Palmyra F1	CT-WL087 x HE367 BC4								33
32	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								32
31	CT-WA088 x HE155 BC4	VT-CC006 x op Am American Seedling	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								31
30	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4								30
29	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WA088 x HE155 BC4	Hu97-13 x Palmyra F1	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								29
28	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								28
27	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling	CT-WL087 x HE367 BC4								27
26	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	Hu97-13 x Palmyra F1	CT-WL087 x HE367 BC4	VCE x OP Ch Chinese	CT-WL087 x HE367 BC4								26
25	VT-CC006 x op Am American Seedling	VCE x OP Ch Chinese	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								25
24	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling								24
23	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	Hu97-13 x Palmyra F1	CT-WL087 x HE367 BC4								23
22	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								22
21	VCE x OP Ch Chinese	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4	VCE x OP Ch Chinese	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								21
20	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WA088 x HE155 BC4	VT-CC006 x op Am American Seedling								20
19	CT-WL087 x HE367 BC4	Hu97-13 x Palmyra F1	VCE x OP Ch Chinese	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling	CT-WL087 x HE367 BC4								19
18	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								18
17	VT-CC006 x op Am American Seedling (888)	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	Hu97-13 x Palmyra F1	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4							Blue Bird Box	17
16	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4								16
15	VT-CC006 x op Am American Seedling	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								15
14	CT-WL087 x HE367 BC4 (888)	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling	CT-WL087 x HE367 BC4	VCE x OP Ch Chinese	Hu97-13 x Palmyra F1							Blue Bird Box	14
13	CT-WL087 x HE367 BC4	VCE x OP Ch Chinese	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								13
12	Hu97-13 x Palmyra F1	CT-WL087 x HE367 BC4	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								12
11	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling								11
10	CT-WL087 x HE367 BC4	Hu97-13 x Palmyra F1	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								10
9	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling	Hu97-13 x Palmyra F1	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4	VCE x OP Ch Chinese								9
8	VCE x OP Ch Chinese	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	VT-CC006 x op Am American Seedling	CT-WL087 x HE367 BC4								8
7	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								7
6	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	VCE x OP Ch Chinese	Hu97-13 x Palmyra F1								6
5	Hu97-13 x Palmyra F1	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	Hu97-13 x Palmyra F1	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4								5
4	CT-WL087 x HE367 BC4	VCE x OP Ch Chinese	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								4
3	VT-CC006 x op Am American Seedling	CT-WA088 x HE155 BC4	VT-CC006 x op Am American Seedling	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4								3
2	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	VCE x OP Ch Chinese	Hu97-13 x Palmyra F1	VT-CC006 x op Am American Seedling								2
1	VT-CC006 x op Am American Seedling	Hu97-13 x Palmyra F1	CT-WA088 x HE155 BC4	CT-WL087 x HE367 BC4	CT-WL087 x HE367 BC4	CT-WA088 x HE155 BC4								1
Position	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Position

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Beaver Dam/Wetland Area

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Tracking the Planting

- Beyond mapping, there is a need to track the planting over time
  - Yearly mortality, growth, performance, additional measures
- Work with Regional Science Coordinator to develop a format and set expectations for data collection
  - TreesDB in under development
    - Should be available "soon" to help track the trees in your planting

Management Recommendations

- Protecting the base of the tree is important, especially while the trees are small
  - Shelters should be removed BEFORE they begin to girdle the tree
  - Good vegetation management will discourage rodent predators and make it easier for raptors to keep populations under control
- Deer browse can be a problem until the trees grow beyond browse height
  - Fencing is key on high-pressure sites
  - Tall shelters can also be used
  - Deterrents – examples: Plantskydd®, Tree Guard® with Bitrex™, Deer-Off!®

Management Recommendations

- Watering is important, especially during establishment
  - Should have a water source available, even if it is trucked in
  - Know your site:
    - Chestnut is fairly drought-tolerant but should be watered during dry periods
    - Seedlings will need more water while their root systems catch-up
- Fertilizing can enhance growth or provide lacking nutrients
  - Use an acid-loving fertilizer
  - Follow label instructions
  - The amount needed will go up as the tree grows
    - Water-soluble is good while trees are small
    - Granular is better as they get larger

Management Recommendations

- Weeds and other competing vegetation can be a big threat to chestnuts, especially during the first 3-5 years
- A 3’ diameter vegetation-free zone around each tree is ideal
  - Herbicide – requires a couple applications/year
    - Be careful spraying – avoid spraying the trees
    - Follow all label instructions!
  - Landscape fabric or other mulches
    - May require maintenance over time to maintain effective control
    - Can provide cover for rodents – keep vegetation next to fabric or mulch short