
A Long-term Silvicultural Study to Evaluate Intensive Management Regimes for Loblolly Pine in the Southeastern USA

Bruce E. Borders, Professor

Warnell School of Forestry and Natural Resources

The University of Georgia

Funding History

- Funding for this study has come from many organizations:
 - ❑ Georgia Power Company
 - ❑ U.S. Department of Energy
 - ❑ Georgia Forestry Commission
 - ❑ Warnell School of Forestry and Natural Resources
 - ❑ Plantation Management Research Cooperative (PMRC) at the University of Georgia
 - ❑ Consortium for Accelerated Pine Production Studies (CAPPS) at the University of Georgia
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Study Region

- Six locations established in various physiographic provinces in Georgia
 - Dawsonville – Foothills of S. Appalachians (2 sites)
 - Athens – Piedmont (1 site)
 - Thomson – Upper Coastal Plain (1 site)
 - Eatonton – Piedmont (2 sites)
 - Tifton – Lower Coastal Plain (1 site)
 - Waycross – Lower Coastal Plain (2 sites)
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Data Presentation

- For this discussion I present stand development information for a Piedmont site located near Eatonton, GA and for two lower coastal plain sites located near Waycross, GA
 - Eatonton site – time replicates established in 1988 (2 complete blocks), 1990 (2 complete blocks) and 1995 (1 complete block)
 - Waycross sites – time replicates established in 1987 (2 complete blocks), 1989 (2 complete blocks) and 1993 (2 complete blocks)
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Study Treatments

- **Control (C)** – Eatonton site preparation simulated a shear-rake-disc operation. Waycross site preparation was a shear-rake treatment followed by bedding.
 - **Fertilizer (F)** – Carry out the site preparation associated with the control. Use the following fertilization regime
 - First two growing seasons – 250 lbs/ac diammonium phosphate (DAP) plus 100 lbs/ac potassium chloride (KCL) in the spring and 50 lbs/ac ammonium nitrate mid-summer.
 - In subsequent growing seasons 150 lbs/ac ammonium nitrate was broadcast in early spring.
 - Age 10, 300 lbs/ac ammonium nitrate plus 125 lbs/ac triple super phosphate early spring.
 - Age 11, 500 lbs/ac Super Rainbow (10-10-10) with micronutrients plus 150 lbs/acre ammonium nitrate early spring.
 - At age 12 forward 300 lbs/acre ammonium nitrate early spring.
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Study Treatments

- **Herbicide (H)** – Use herbicides as needed to control all herbaceous and woody competing vegetation throughout the life of the study.
 - **H x F** – both the H and F treatments
 - Note – all plots established at approximately 680 bare root loblolly pine trees/acre on 3/8 acre gross plot with 1/8 acre interior measurement plot
 - All plots measured for various characteristics annually starting following the first growing season
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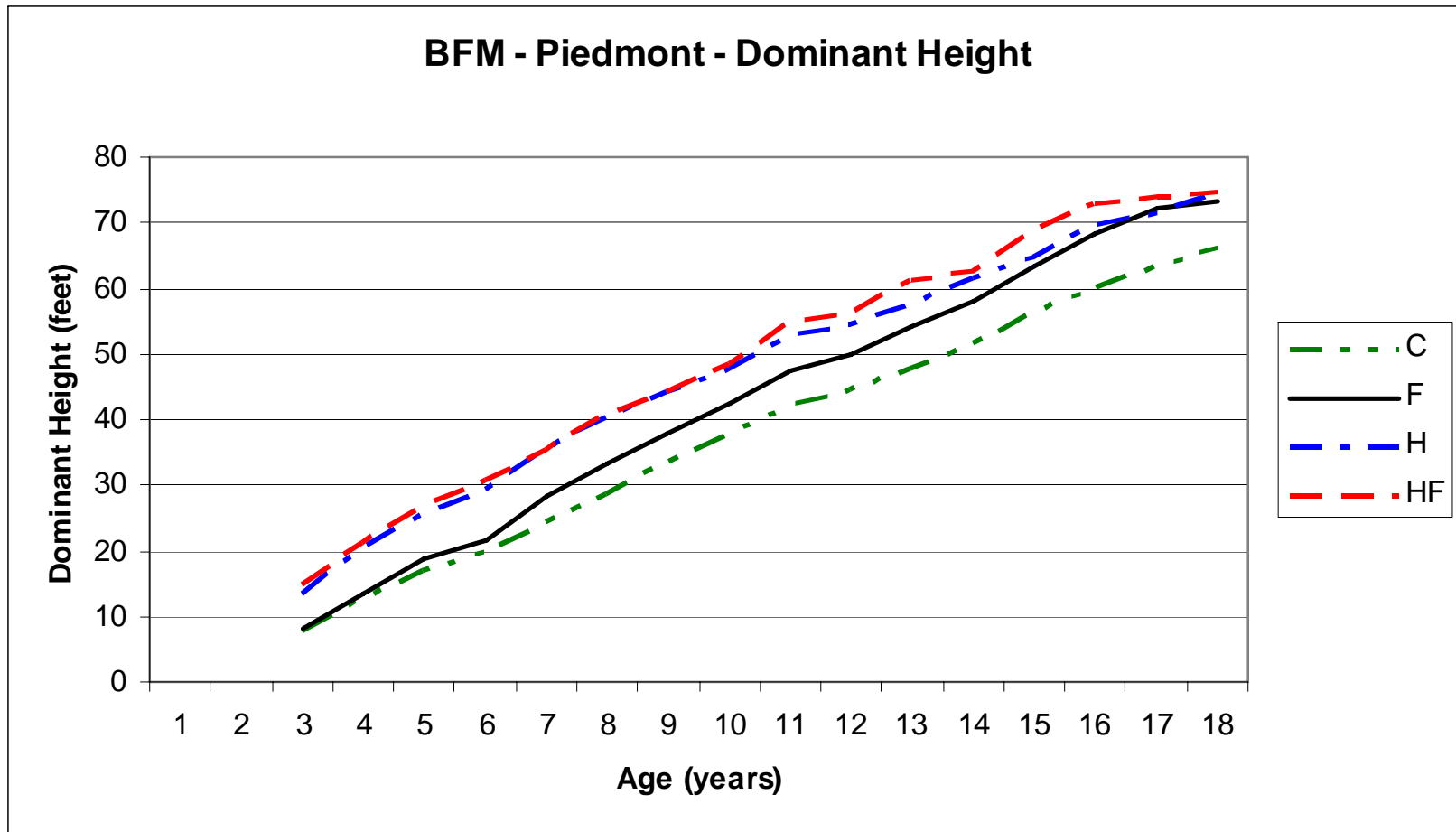
Stand Dynamics at Eatonton - Piedmont

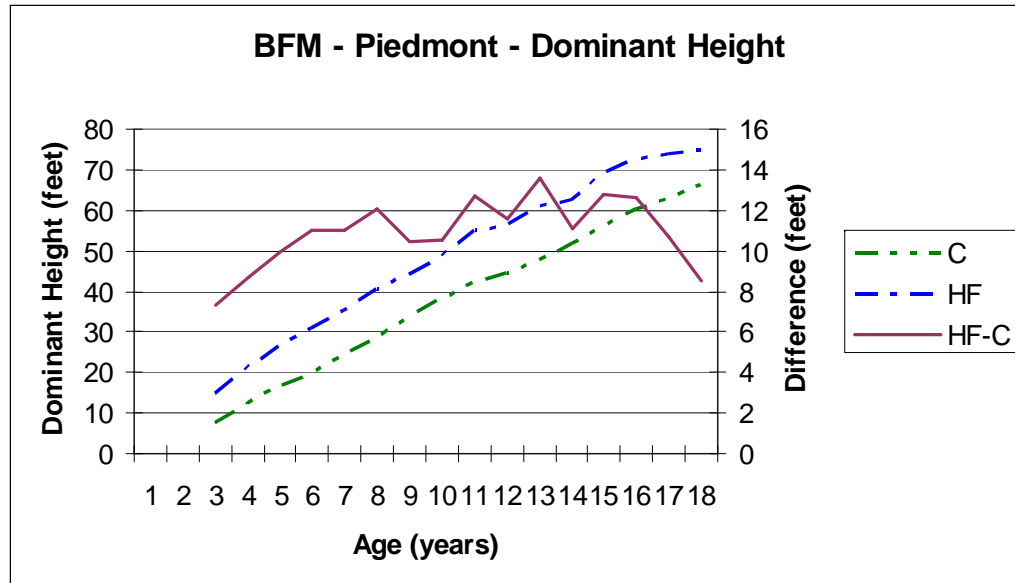
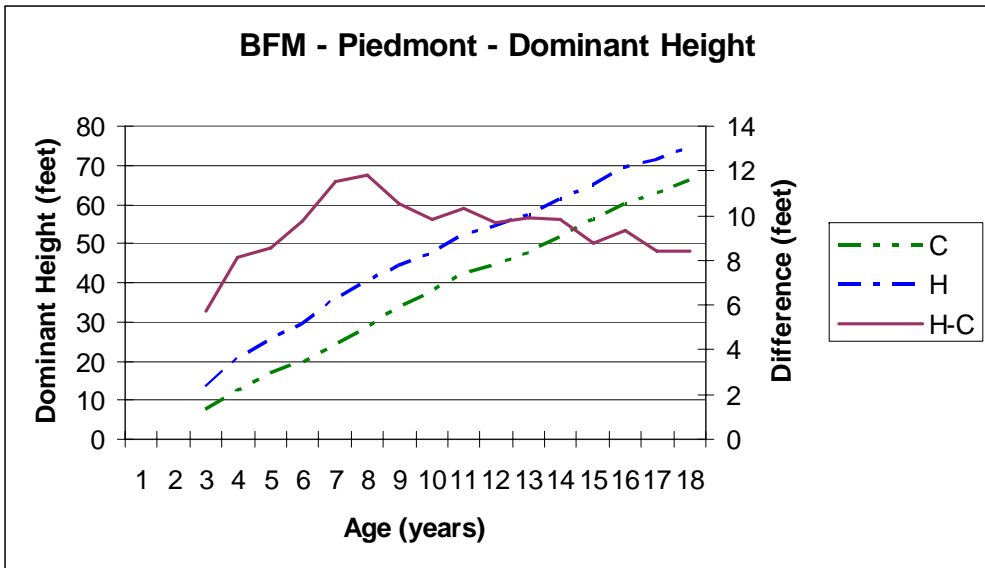
- Ages – 18, 16 and 11 years
 - Soils
 - Well drained
 - Soil Series - Cecil in association with Pacolet and Appling on sloping plots
 - Slope ranges from 1 to 15%
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Stand Dynamics at Eatonton - Piedmont

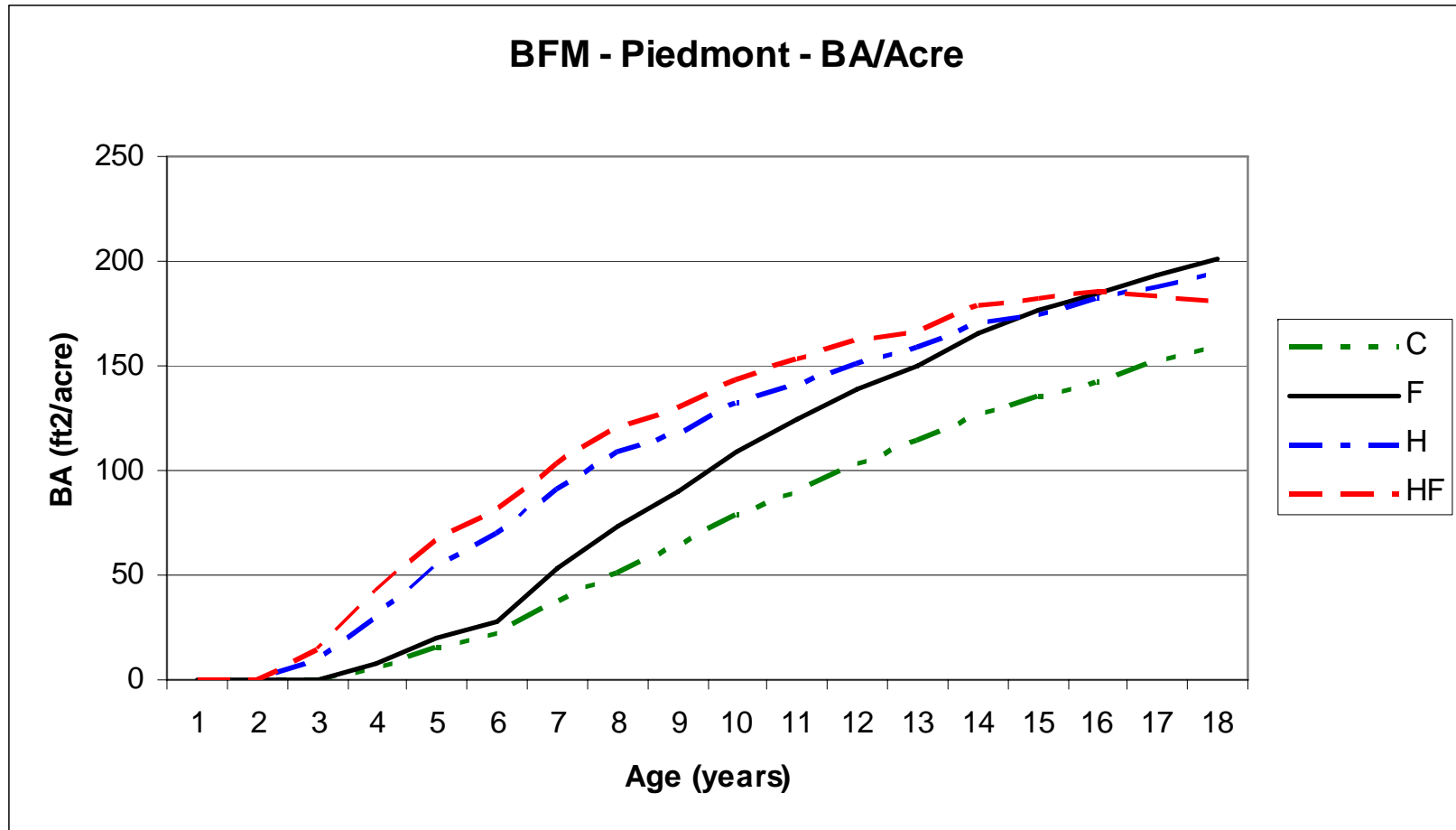
- Ages – 18, 16 and 11 years
 - Vegetation control provides largest gains through age 8 to 10 years
 - Fertilization becomes important at about age 7 when dominant height, basal area/acre and tons/acre begin to accelerate toward vegetation control plots
 - Control plots continue to track upward – it is possible that unit area values may approach the more intensively managed plots within the next 7+ years (i.e. by age 25)
 - Control Site Index (base age 25 years) approximately 75 feet – if the current difference in dominant height continues to exist through age 25 the HF treatment will have a Site Index of approximately 87 to 90 feet
 - Maximum production of 10 tons/acre/year (age 16 years)
 - Most productive treatments holding 40 tons/acre more than control treatment at age 18 years
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Eatonton – Dominant Height

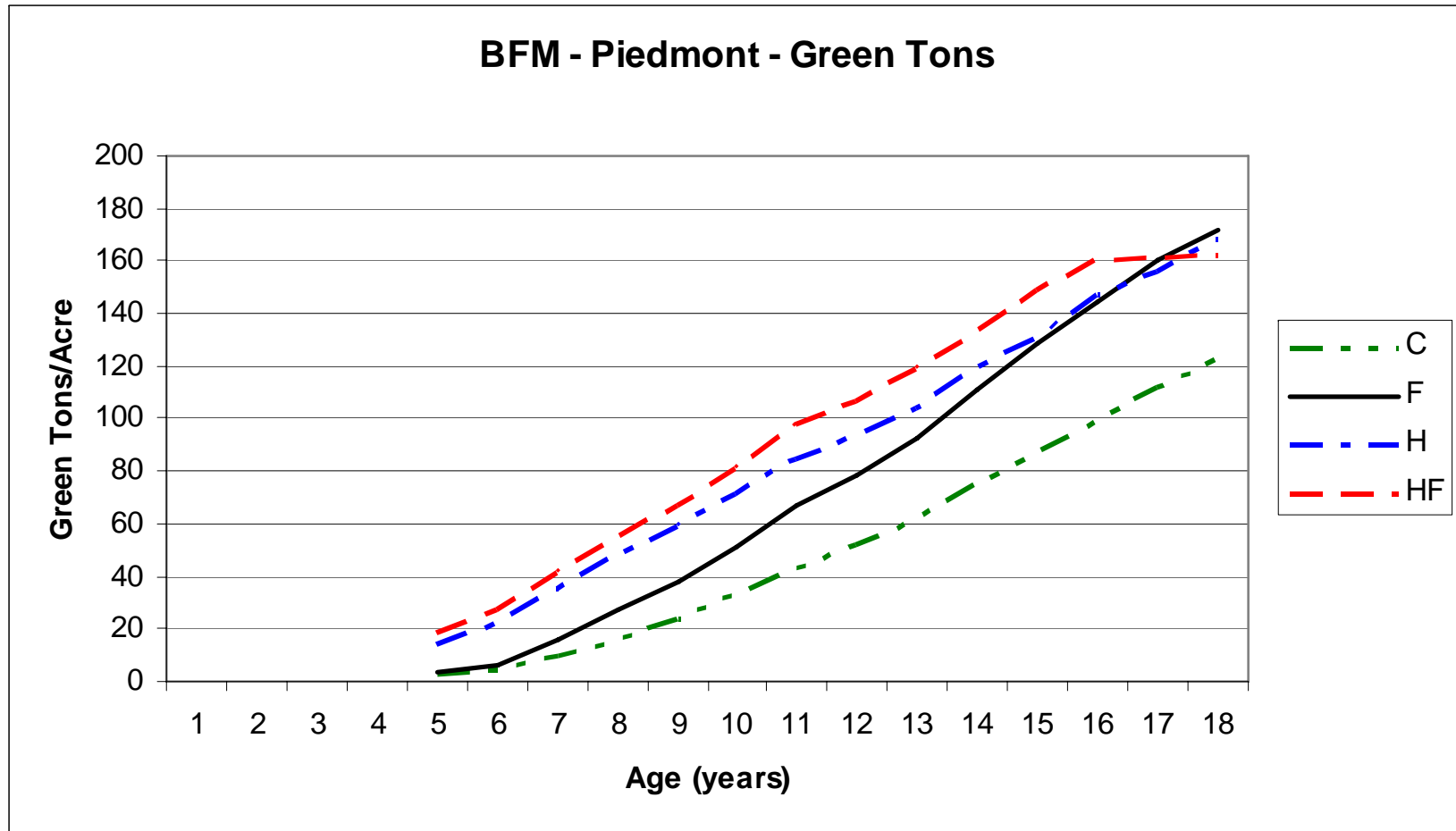




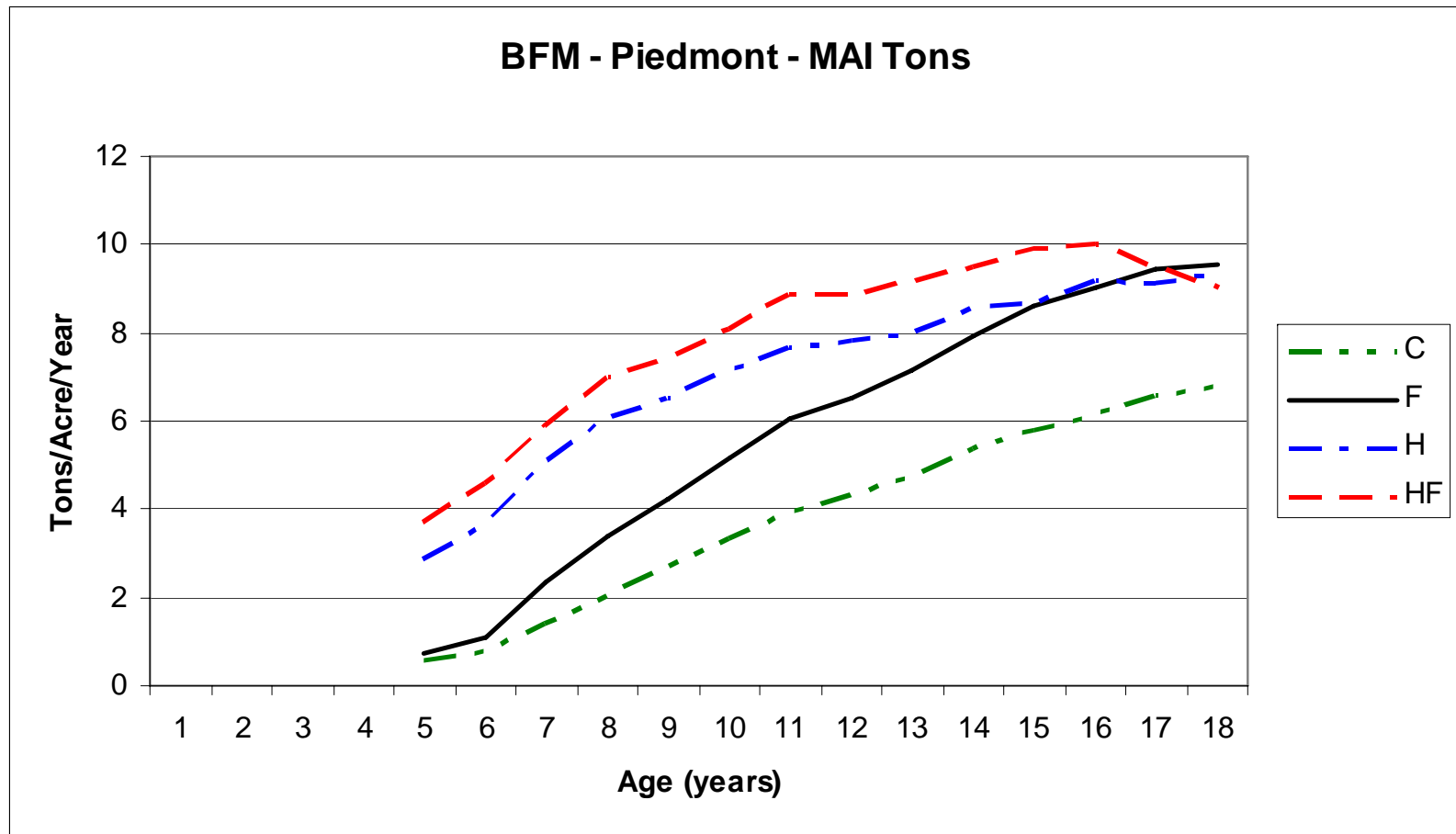
Eatonton – Basal Area/Acre



Eatonton – Tons/Acre

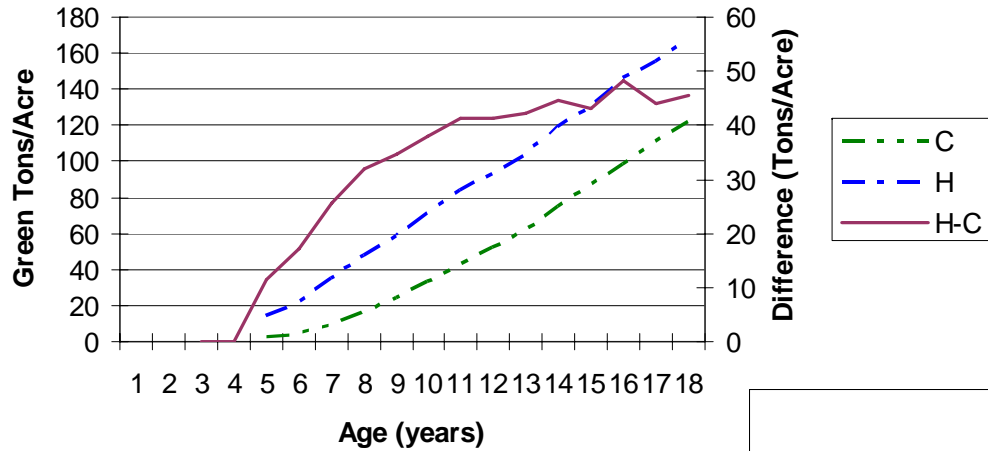


Eatonton – MAI (Tons/Acre/Year)

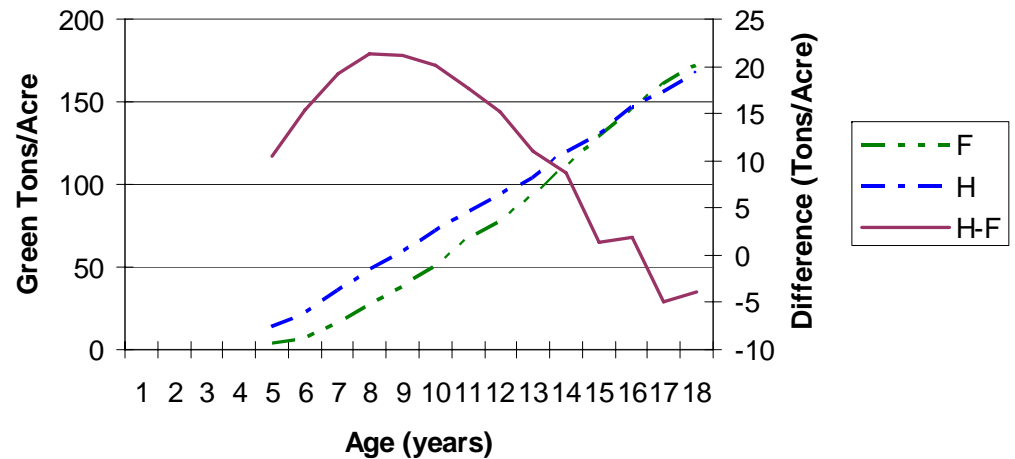


Eatonton – Tons/Acre - Comparison

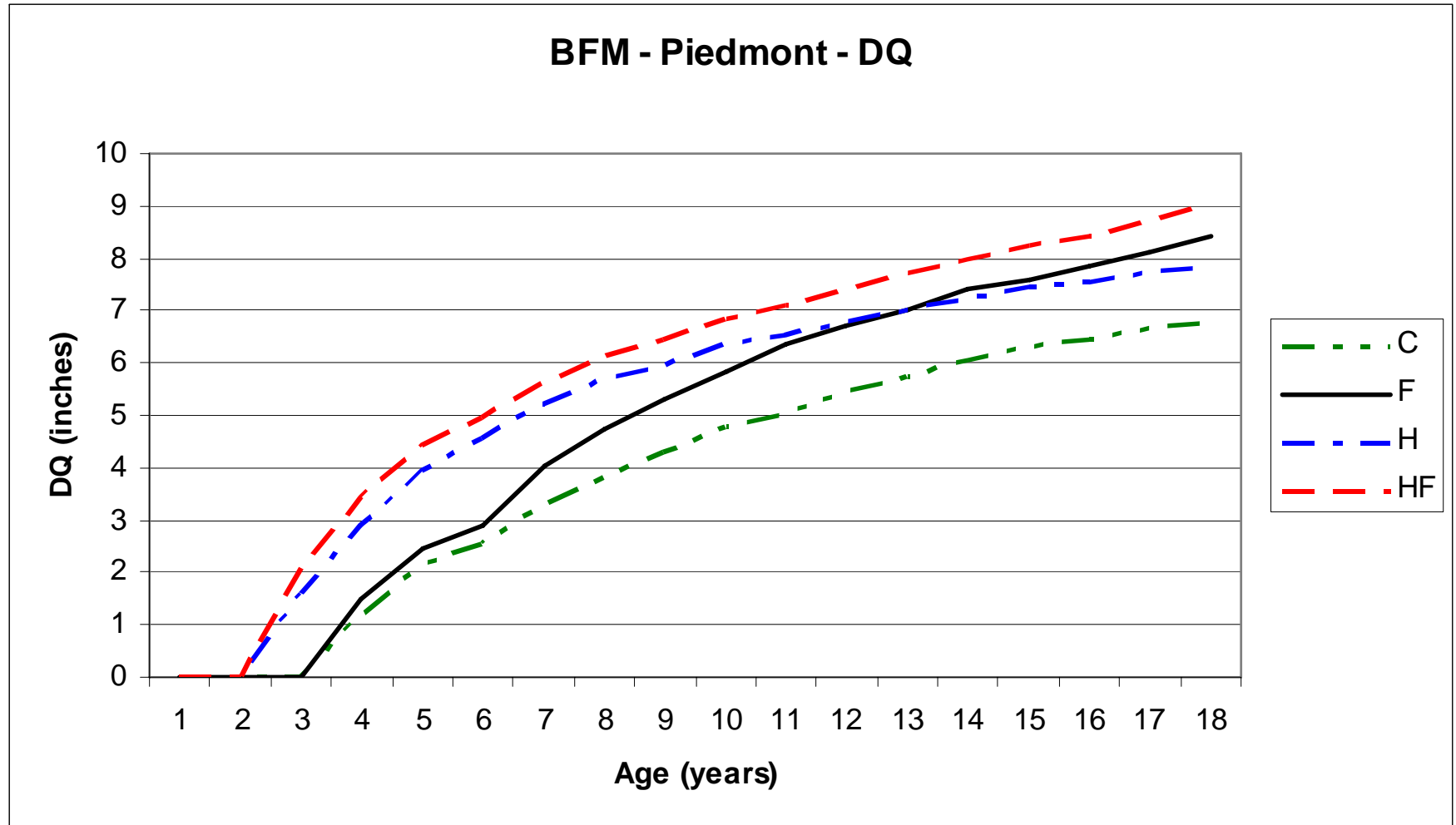
BFM Piedmont - Green Tons



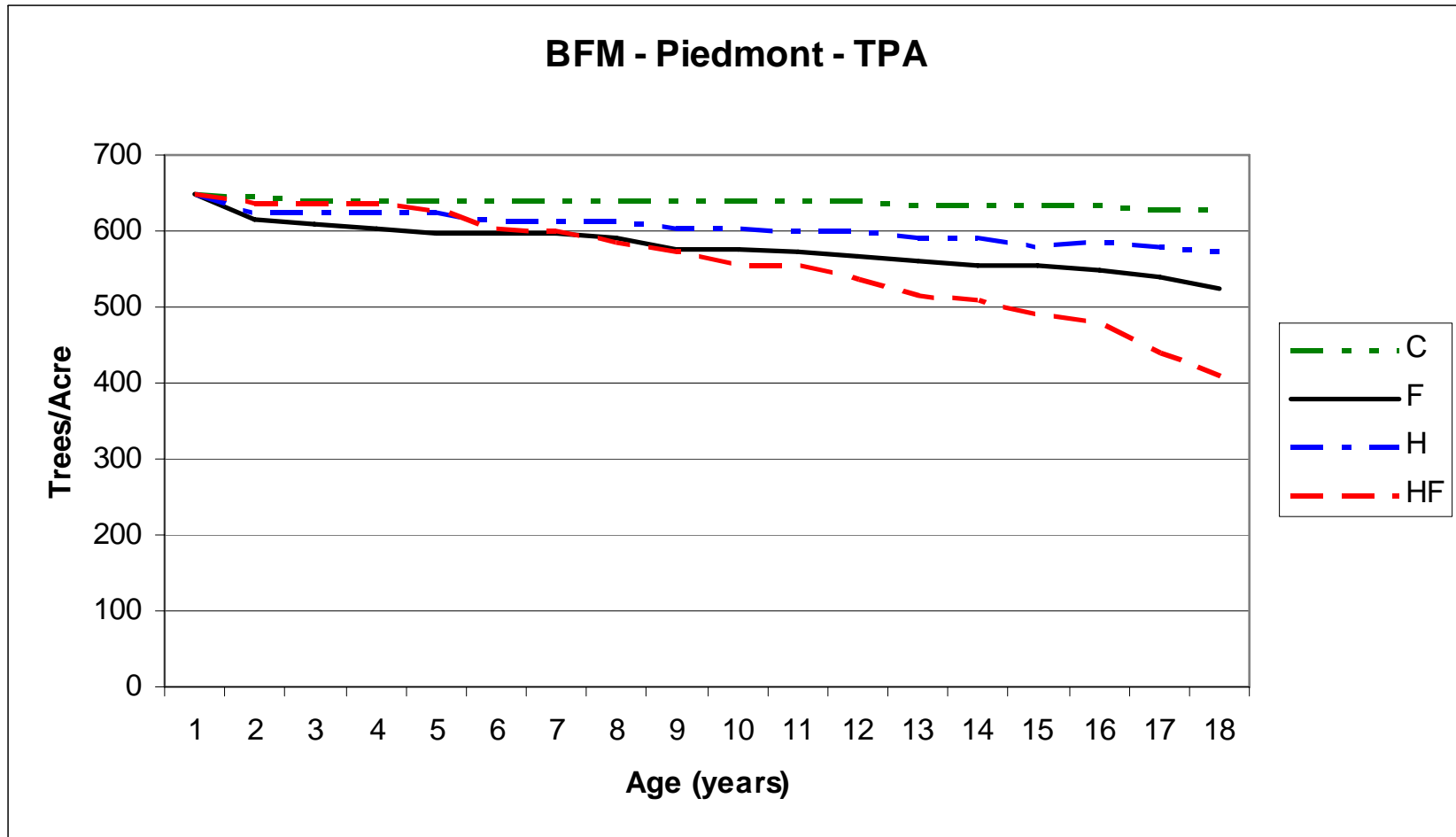
BFM - Piedmont - Green Tons



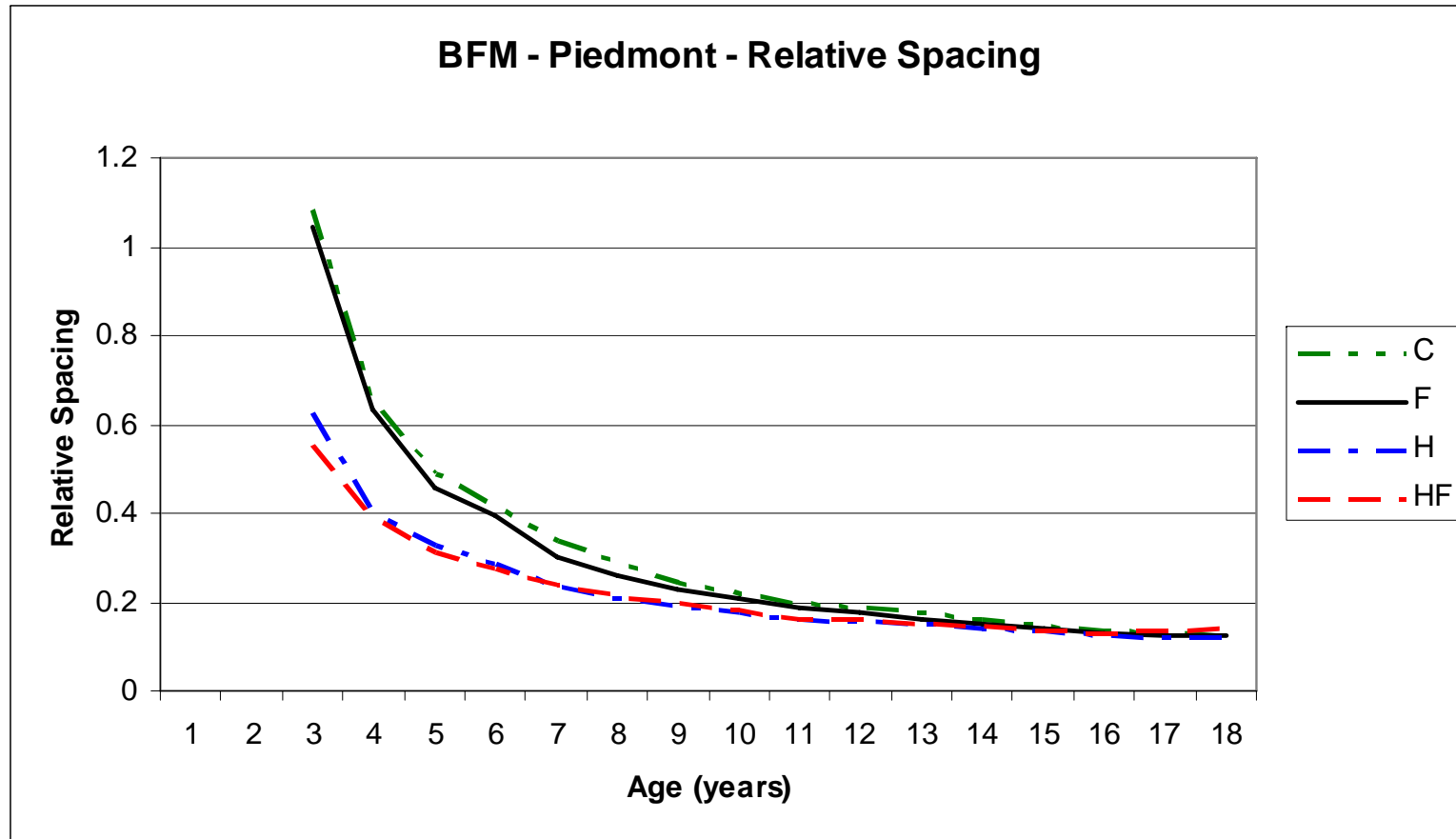
Eatonton – Quadratic Mean DBH (in.)



Eatonton – Survival



Eatonton – Relative Spacing



Stand Dynamics at Waycross – Lower Coastal Plain

- Ages – 19, 17 and 13 years
 - Wet Site
 - Poorly to somewhat poorly drained
 - Soil series – pelham in association with rigdon (spodic horizons present but not predominant)
 - Dry Site
 - Well drained to moderately well drained
 - Soil series – bonifay in association with blanton (both series have >100 cm of sand with plinthite present for bonifay)
 - Both sites are typical of the lower coastal plain of Georgia with <1% slope
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Stand Dynamics at Waycross – Lower Coastal Plain

■ Wet Site

- Control Site Index (base age 25 years) approximately 77 feet – if the current difference in dominant height continues to exist through age 25 the HF treatment will have a Site Index of approximately 92 to 95 feet (age 19 dominant height is 87 feet)

■ Dry Site

- Control Site Index (base age 25 years) approximately 81 feet – if the current difference in dominant height continues to exist through age 25 the HF treatment will have a Site Index of approximately 90 to 93 feet (age 19 dominant height is 83 feet)
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Stand Dynamics at Waycross – Lower Coastal Plain

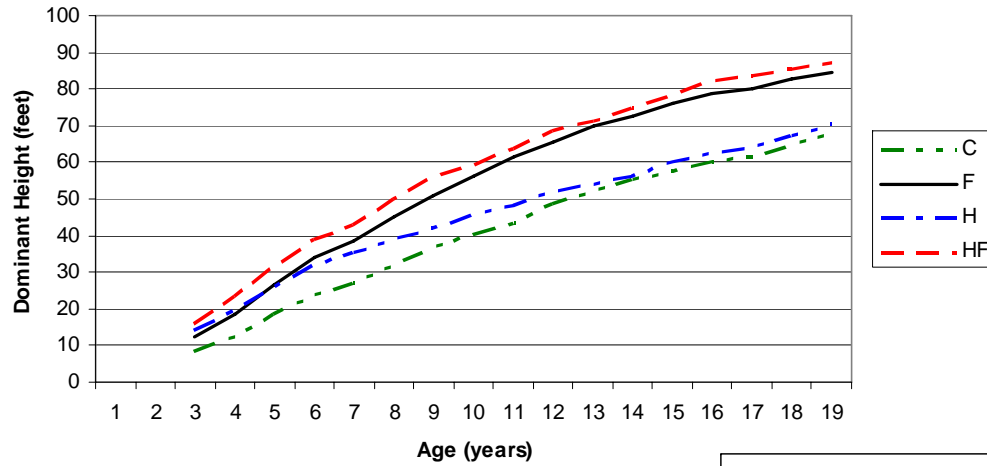
- Vegetation control provides largest gains through age 3 to 4 years –
 - Fertilization becomes important by age 3 when dominant height, basal area/acre and tons/acre begin to accelerate toward vegetation control plots (more important on the Wet Site)
 - Control plots continue to track upward –
 - Unlikely that Dominant Height for unfertilized plots will reach fertilized treatments,
 - Basal area/acre may approach more intensive treatments within next 5+ years
 - Unlikely that yield will approach fertilized treatment because of the shorter trees
 - Wet site is more nutrient poor than dry site as evidence by dramatic slow down in production on H treatment plots
 - Bottom-line – nutrition most important factor;
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Stand Dynamics at Waycross – Lower Coastal Plain

- Maximum production on Wet Site – 14 tons/acre/year (age 13 years)
 - Maximum production on Dry Site – 12.5 tons/acre/year (age 14 years)
 - Most productive treatments (F and HF) have increased production over the control plots by over 80% on the Wet Site and over 55% on the Dry Site at age 19 years
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Waycross – Dominant Height

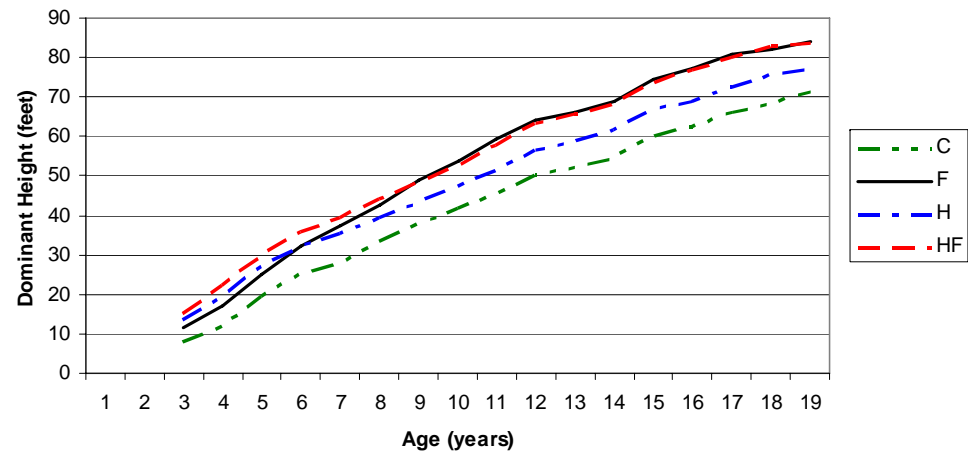
WCW - Lower Coastal Plain - Dominant Height



WET Site

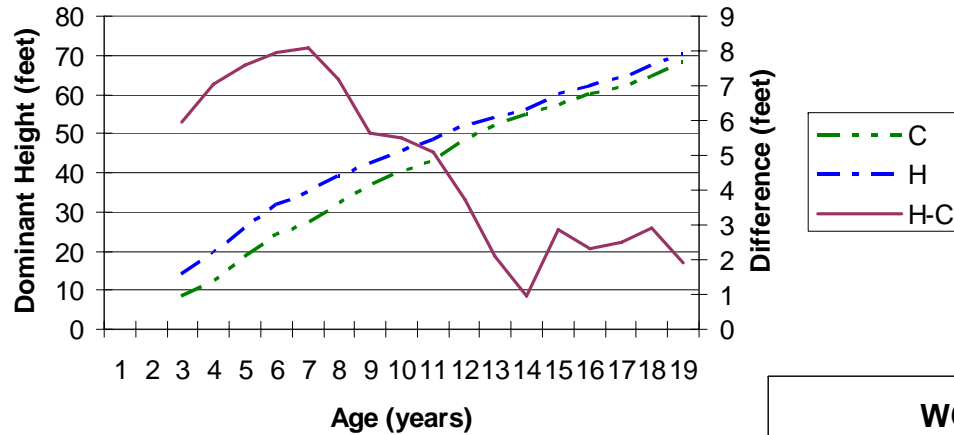
DRY Site

WCD - Lower Coastal Plain - Dominant Height

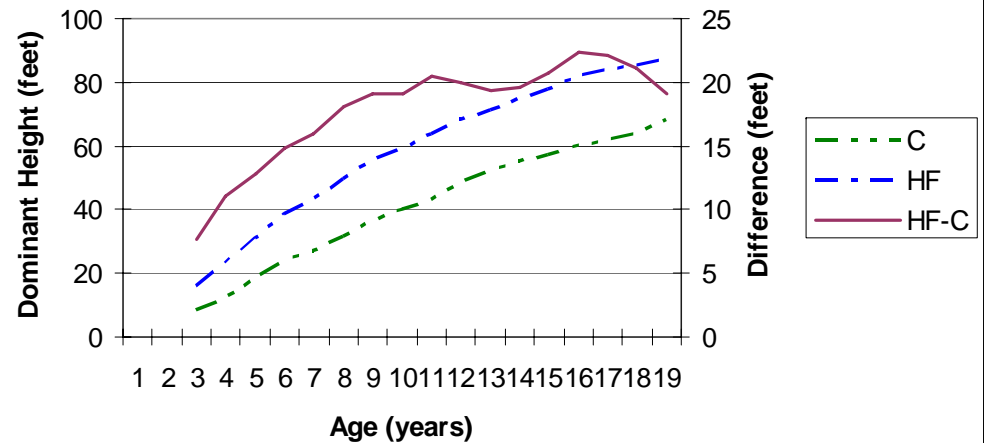


Waycross – Wet Site

WCW - Lower Coastal Plain - Dominant Height

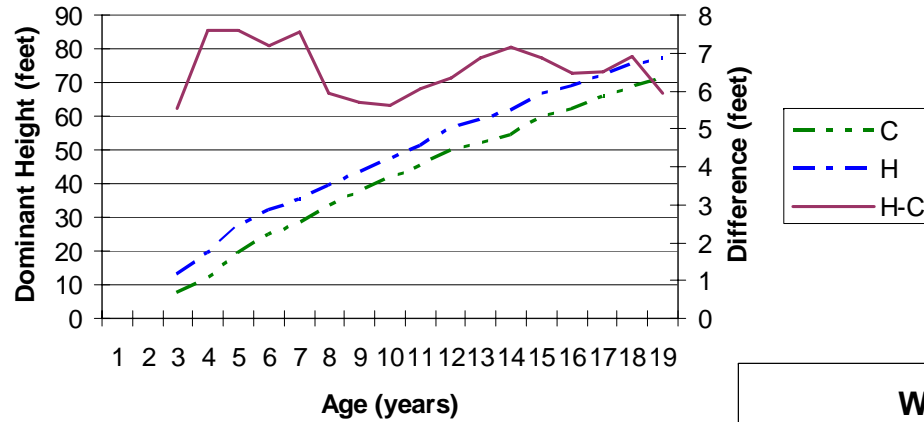


WCW - Lower Coastal Plain - Dominant Height

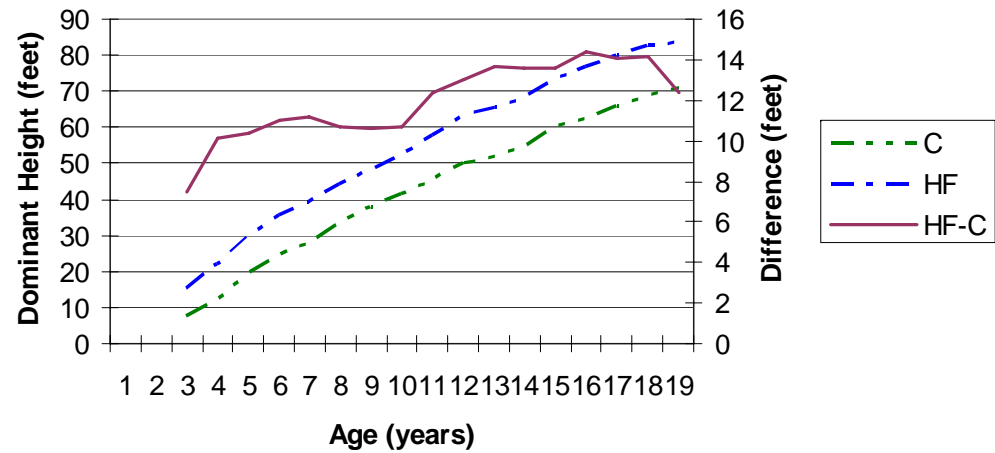


Waycross – Dry Site

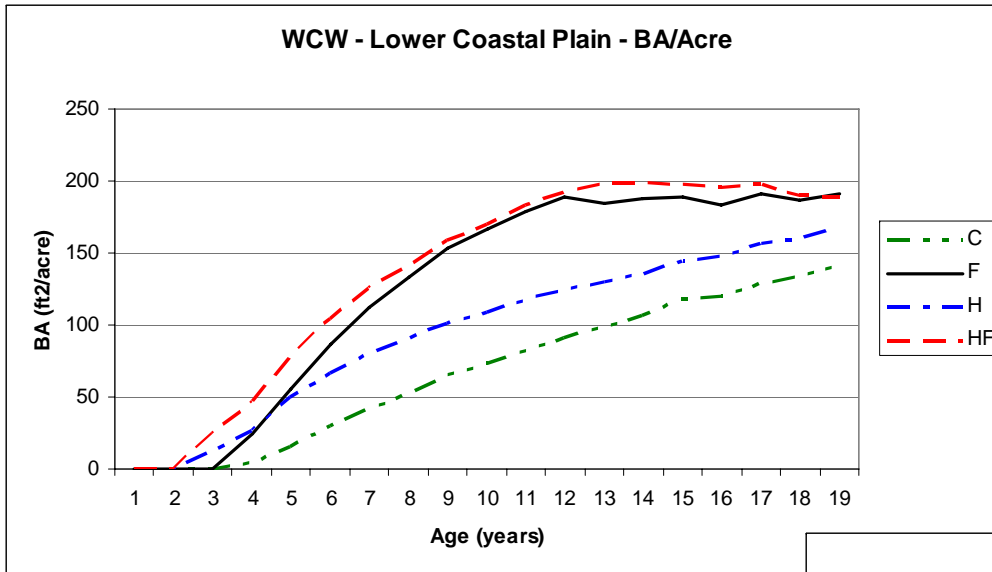
WCD - Lower Coastal Plain - Dominant Height



WCD - Lower Coastal Plain - Dominant Height

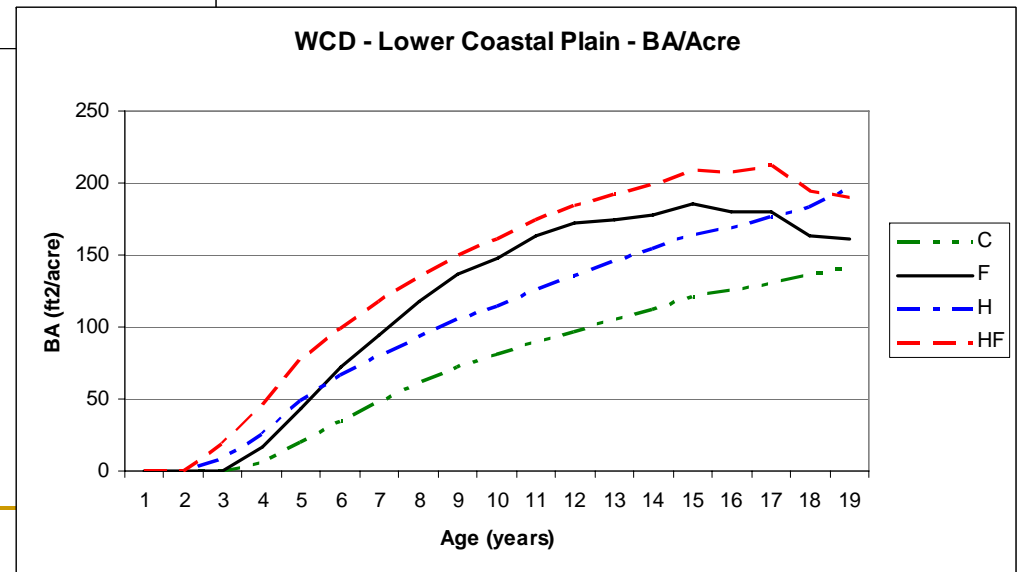


Waycross – BA/Acre

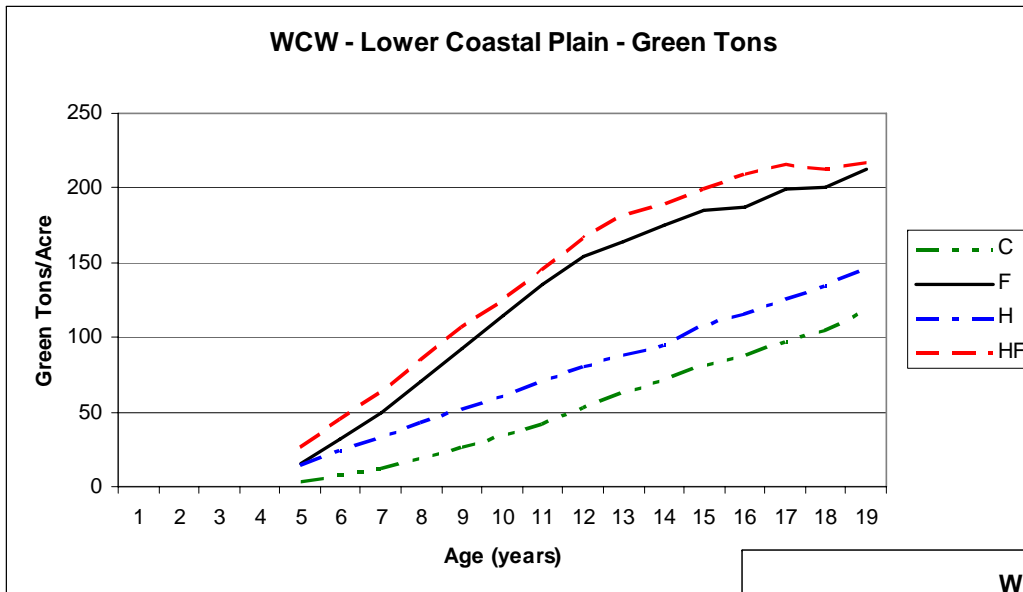


WET Site

DRY Site

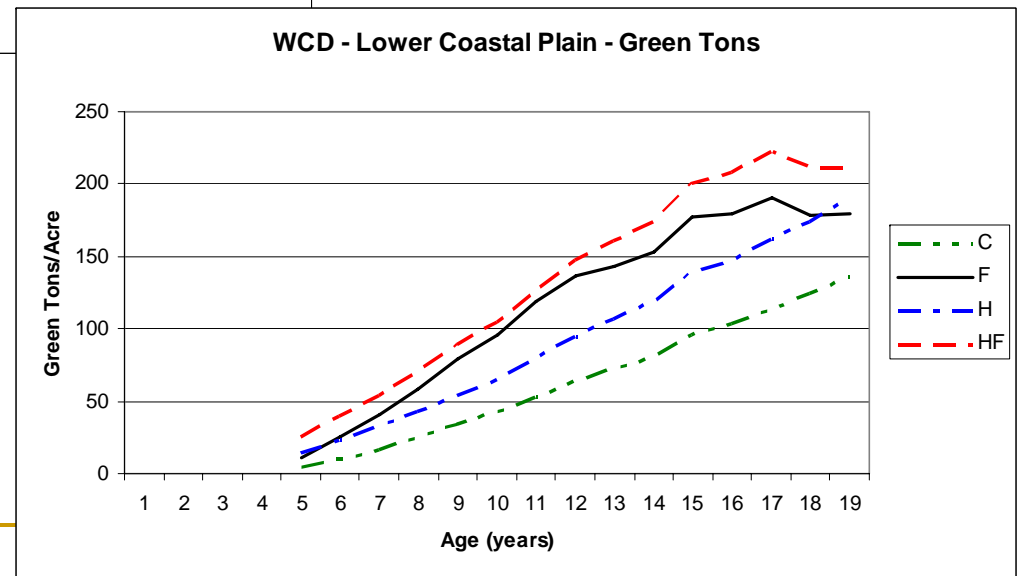


Waycross – Tons/Acre



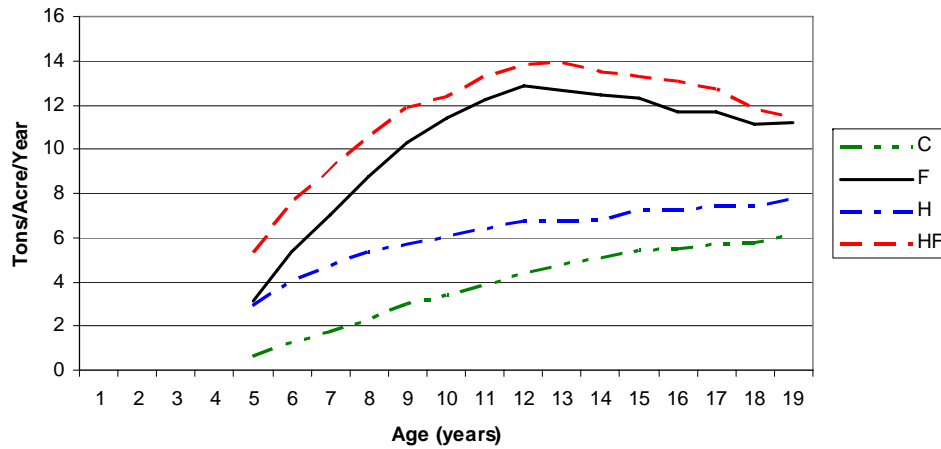
WET Site

DRY Site



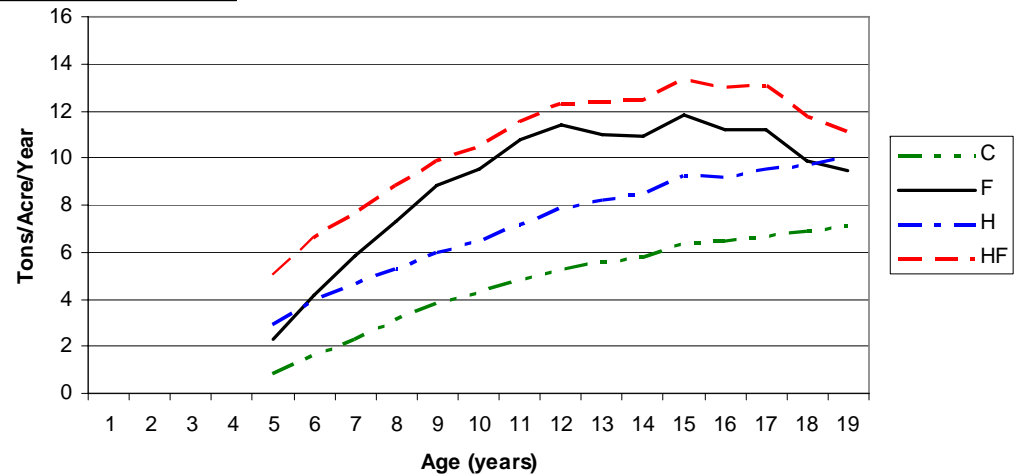
Waycross – MAI (Tons/Acre/Year)

WCW - Lower Coastal Plain - MAI Tons



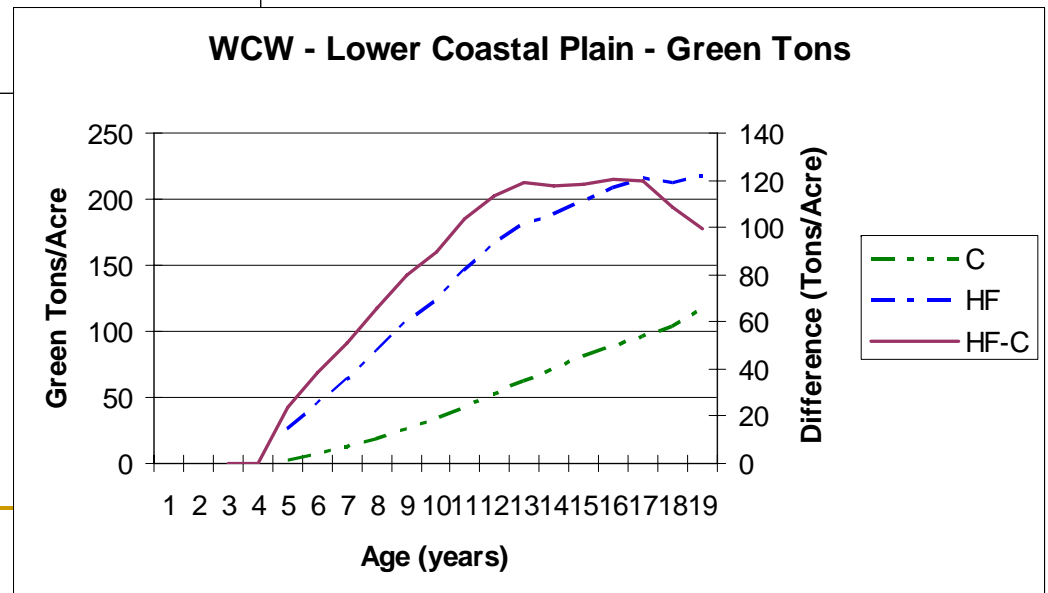
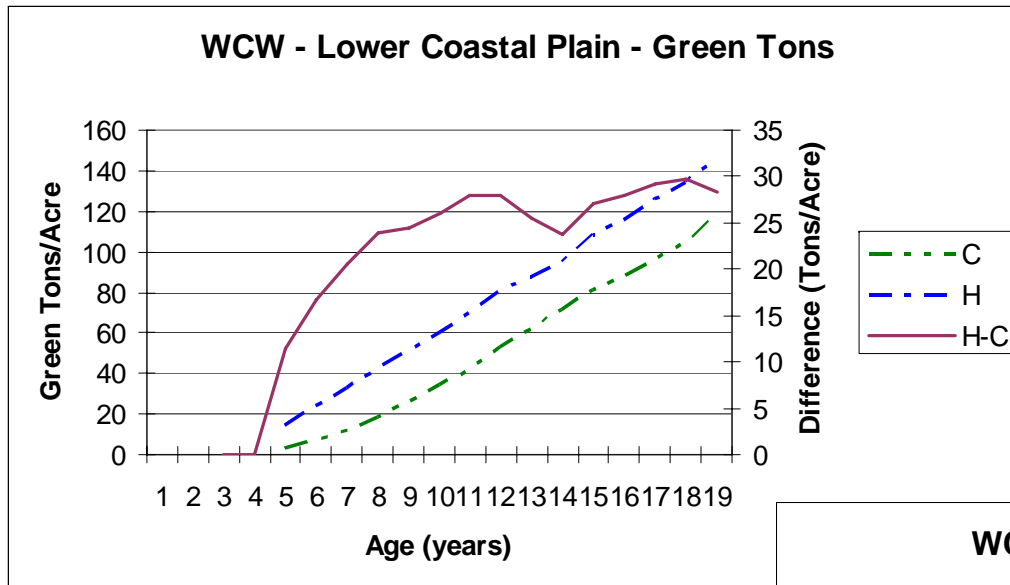
WET Site

WCD - Lower Coastal Plain - MAI Tons

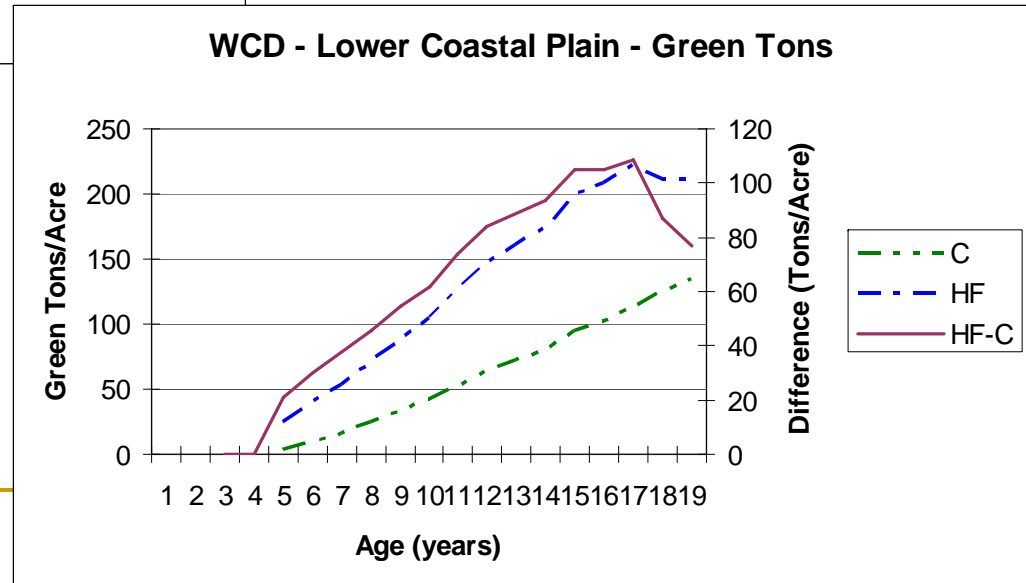
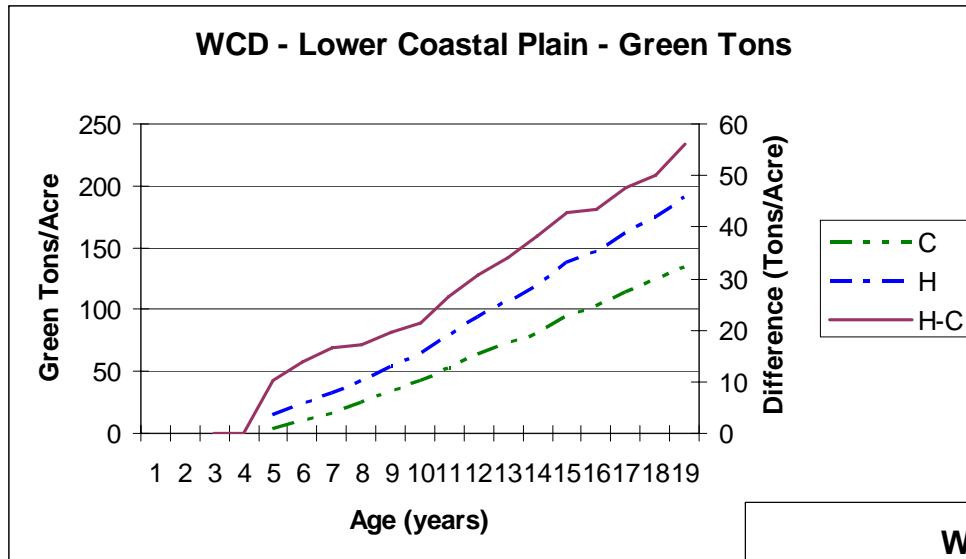


DRY Site

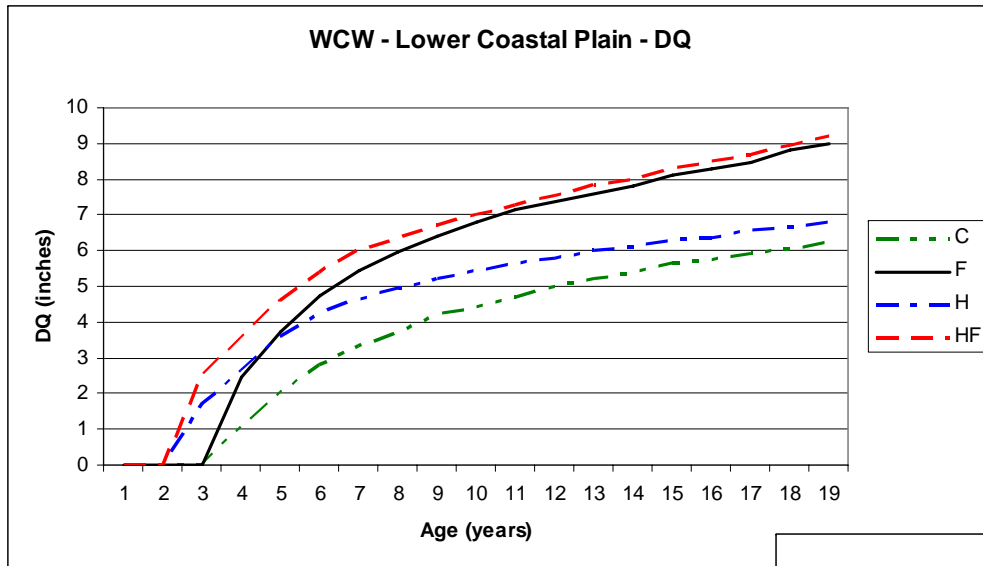
Waycross Wet Site – Tons/Acre – Comparison Wet Site



Waycross Dry Site – Tons/Acre – Comparison Dry Site

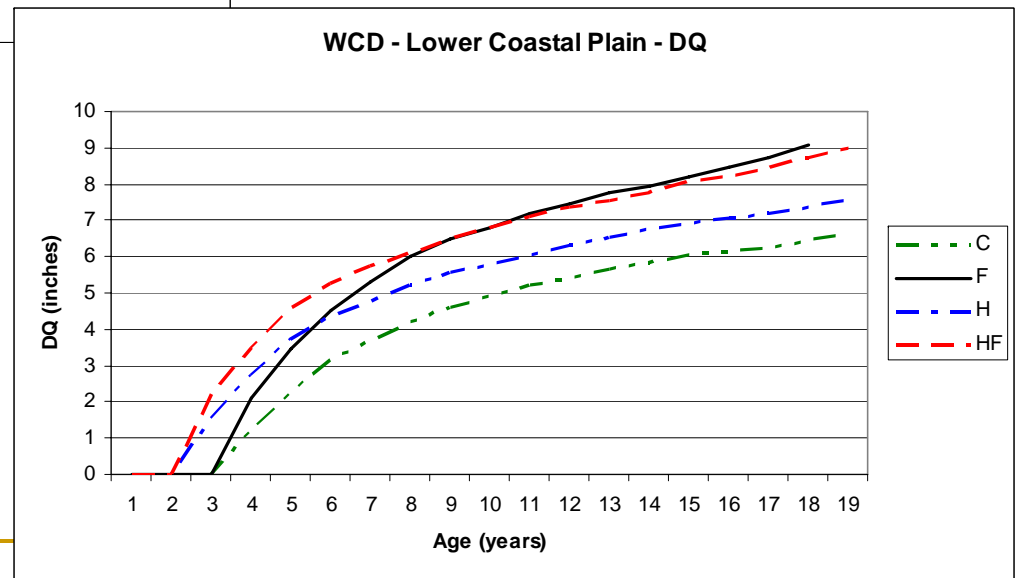


Waycross – Quadratic Mean DBH



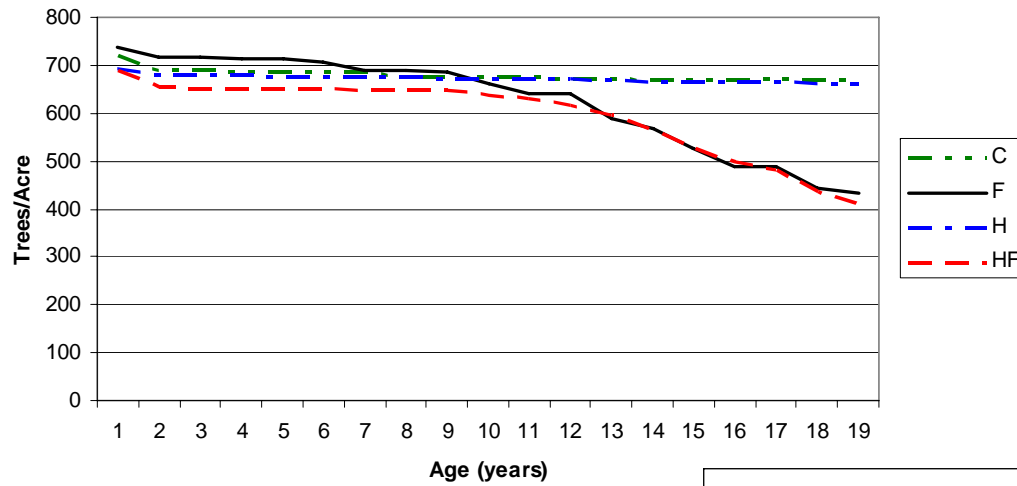
WET Site

DRY Site



Waycross - Survival

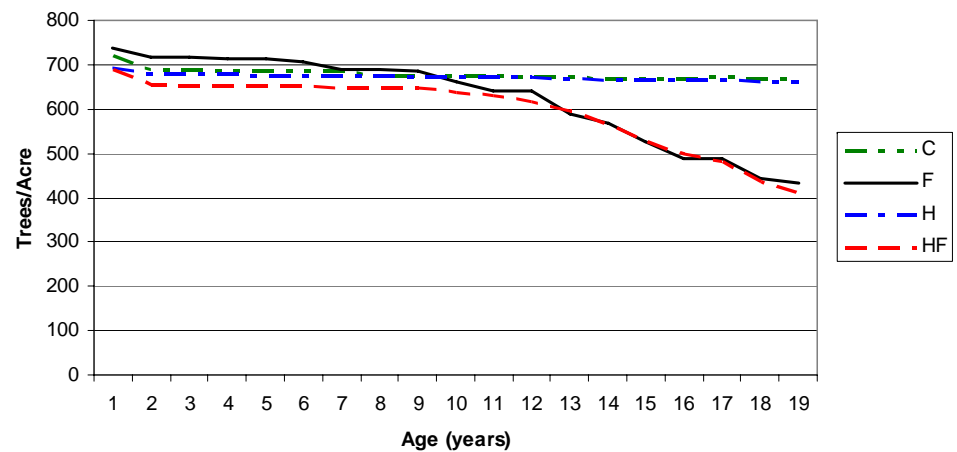
WCW - Lower Coastal Plain - Trees/Acre



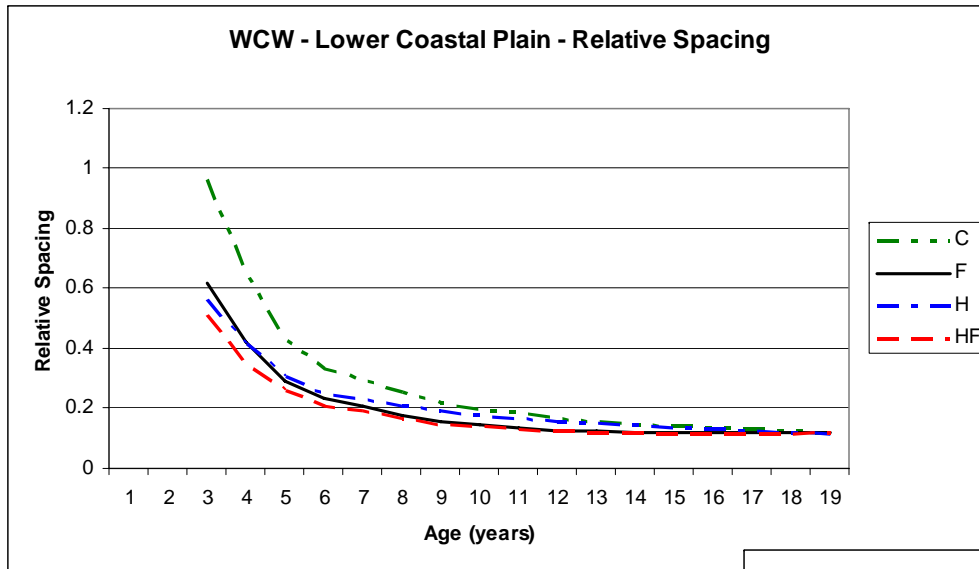
WET Site

DRY Site

WCD - Lower Coastal Plain - Trees/Acre

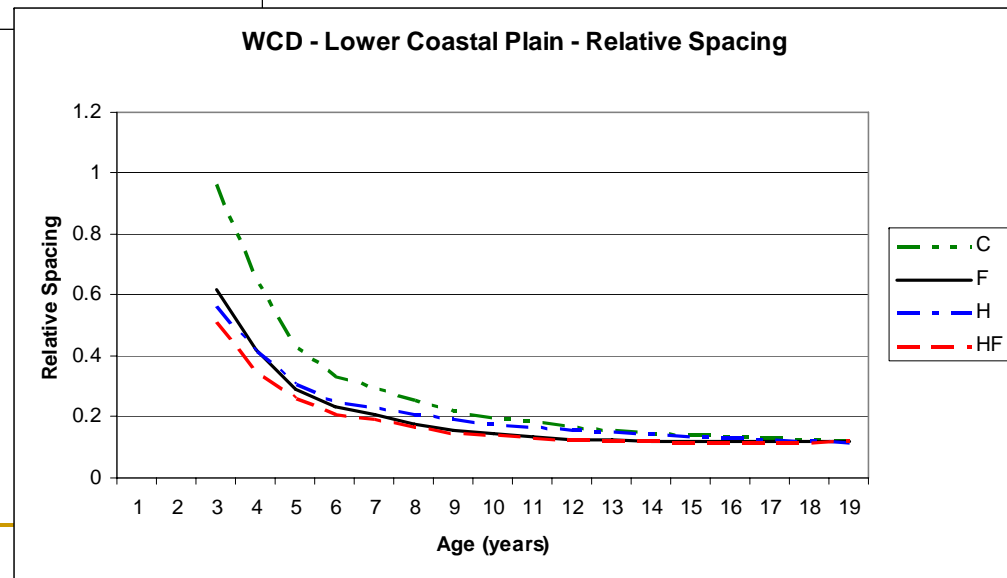


Waycross – Relative Spacing



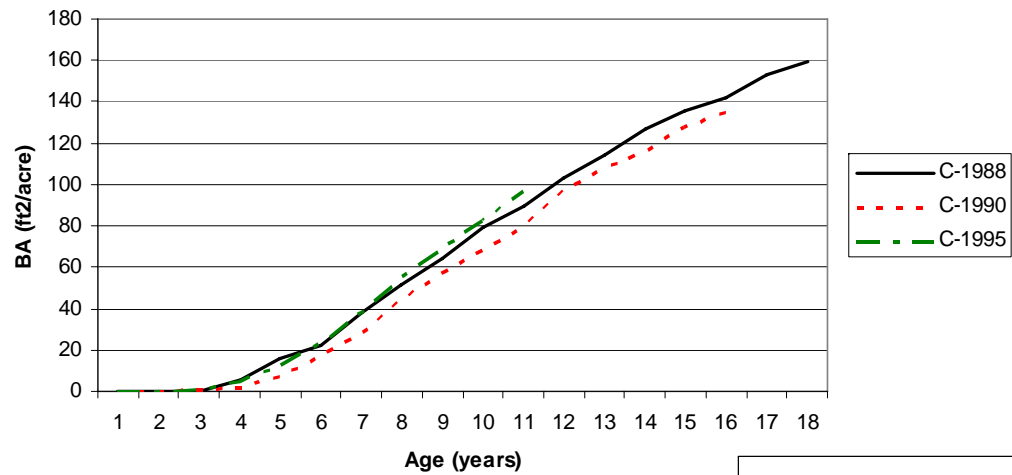
WET Site

DRY Site

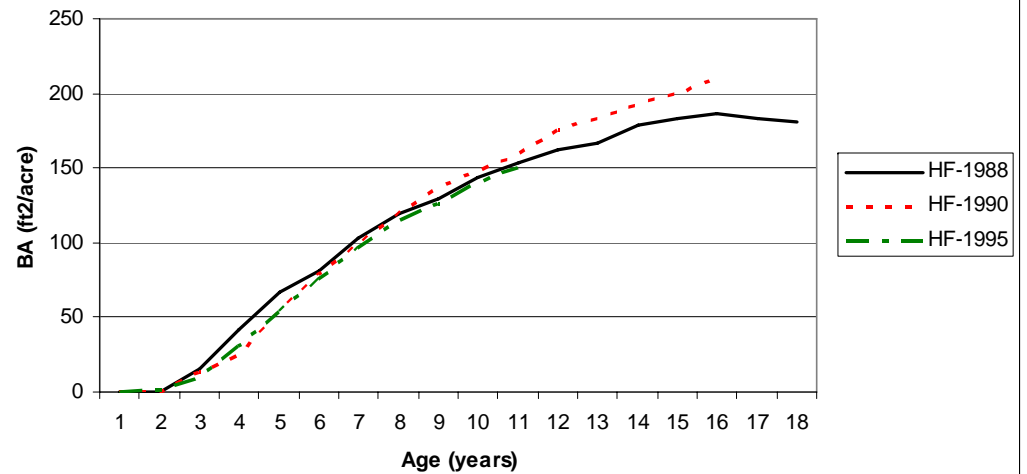


Time Replication – Eatonton (Piedmont)

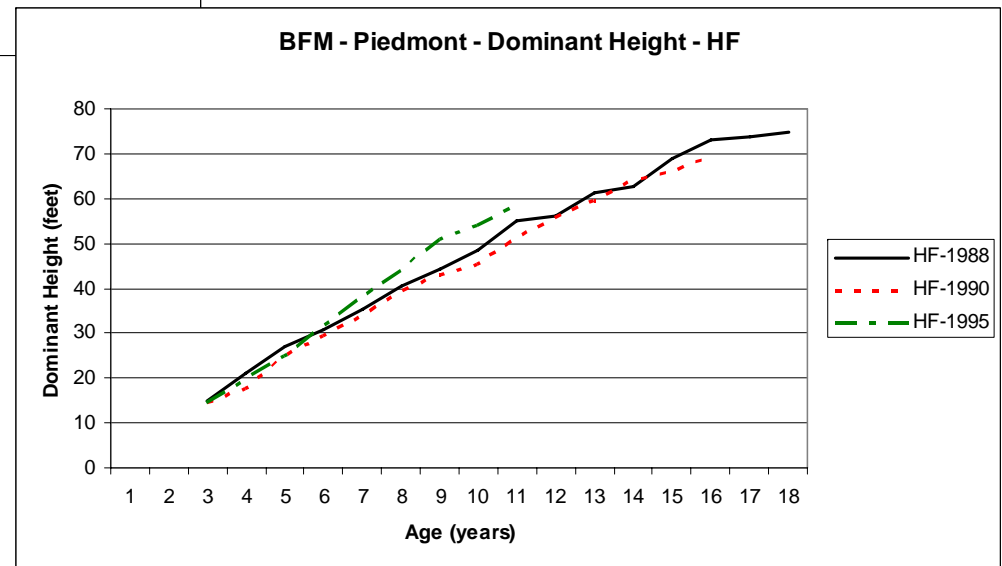
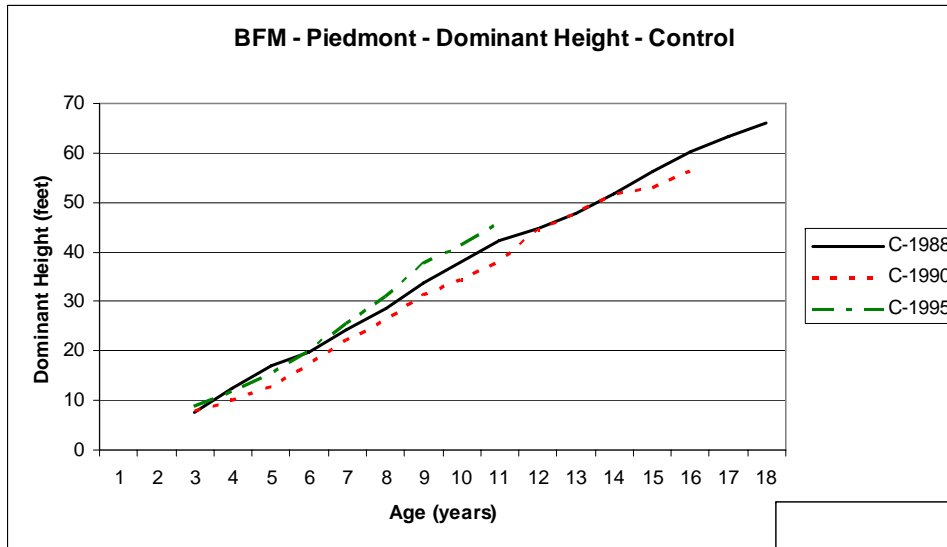
BFM - Piedmont - BA/Acre - Control



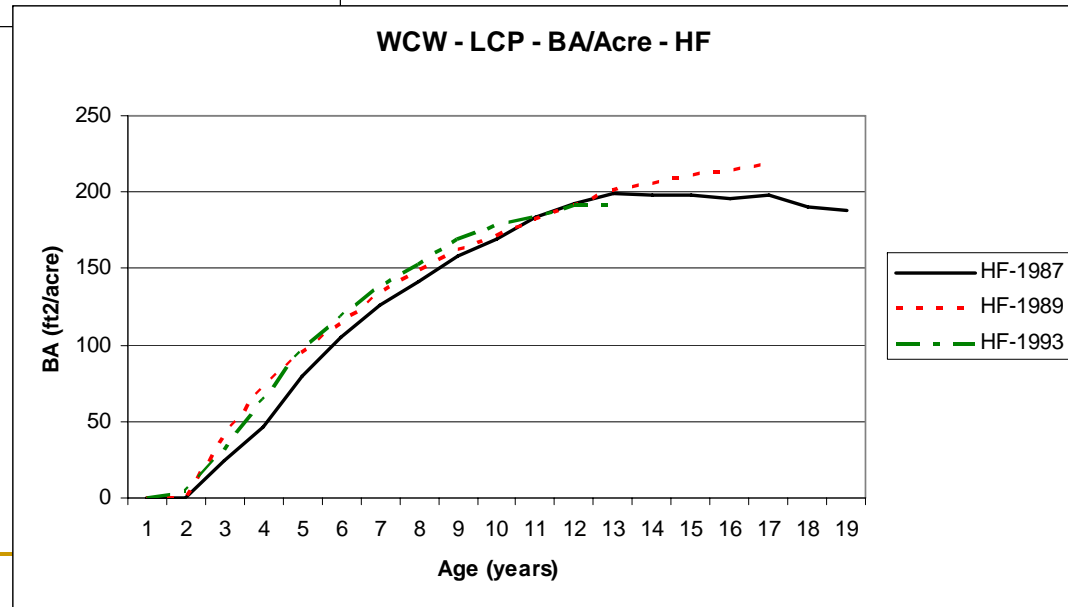
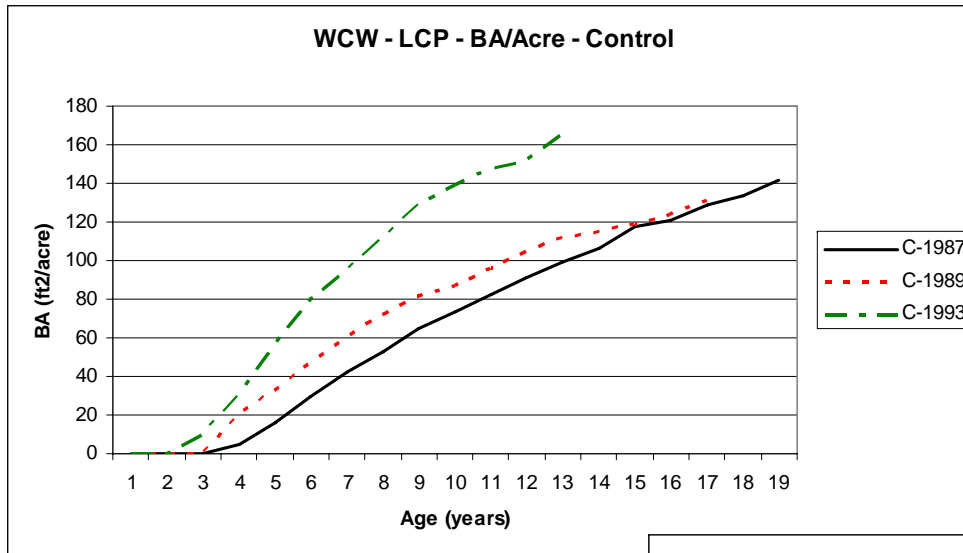
BFM - Piedmont - BA/Acre - HF



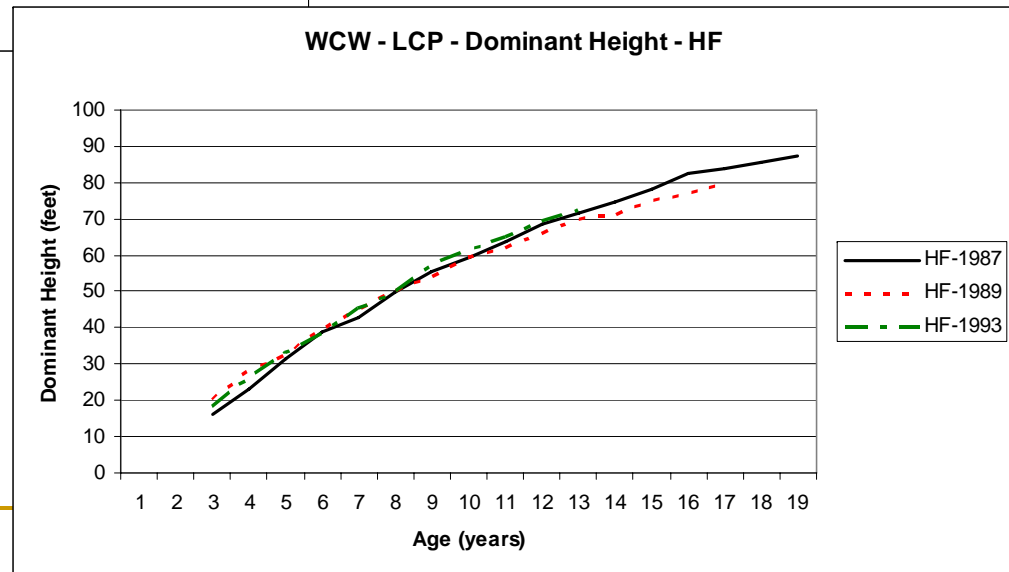
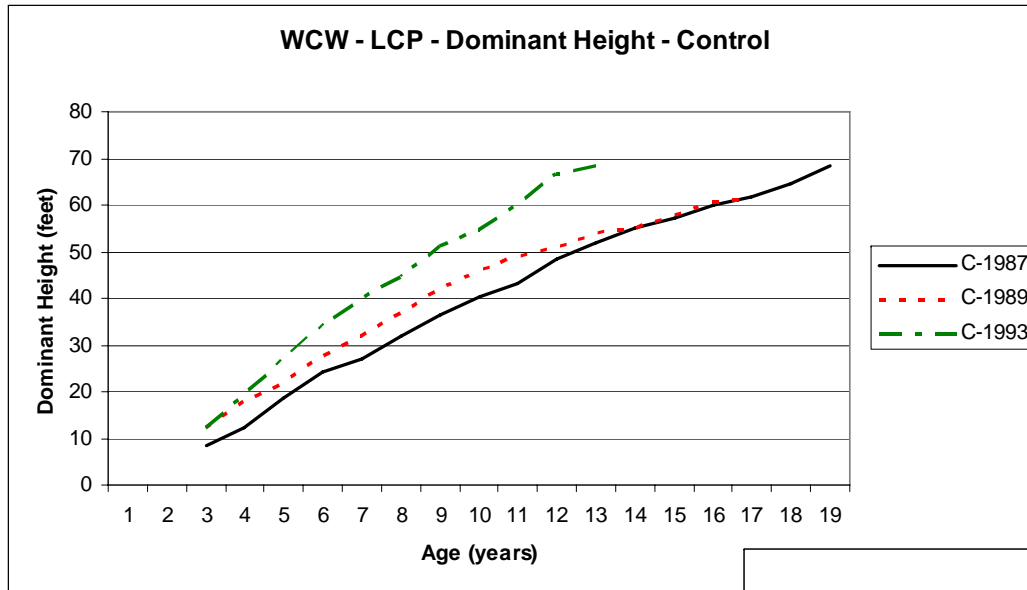
Time Replication – Eatonton (Piedmont)



Time Replication – Waycross Wet Site



Time Replication – Waycross Wet Site



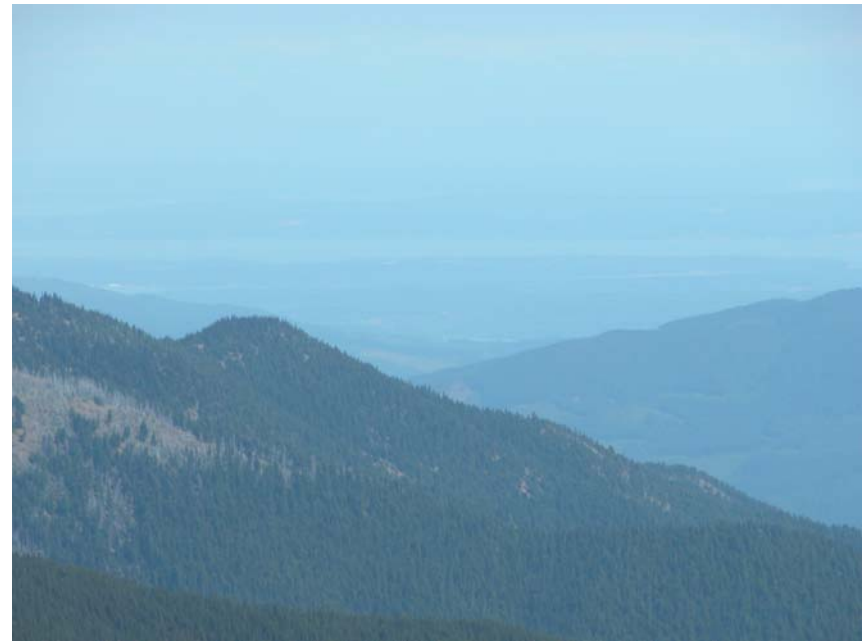
Summary

- Stand development is controlled by the most limiting growth factor
 - Moisture availability
 - Nutrient availability
 - Light availability
 - Rooting Volume
 - Climate
 - By establishing and following long term field studies such as the one described above, we gain the understanding that is necessary to establish site specific silvicultural prescriptions so as to meet product objectives and to calibrate timber growth and yield models
 - I encourage all interested parties to continue to develop new and innovative field studies – unfortunately, there is no substitute for empirical data from such field studies (my apologies to those researchers who like to generate their own theoretically correct data!!)
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Questions/Comments??



We grow and harvest timber here



So we don't have to harvest timber here!
