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Poplar Plantation Management for Biomass Production in the Pacific Northwest



Feedstock



Conversion



Sustainability



Education



Extension



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AHB Phase I poplar demonstration farms



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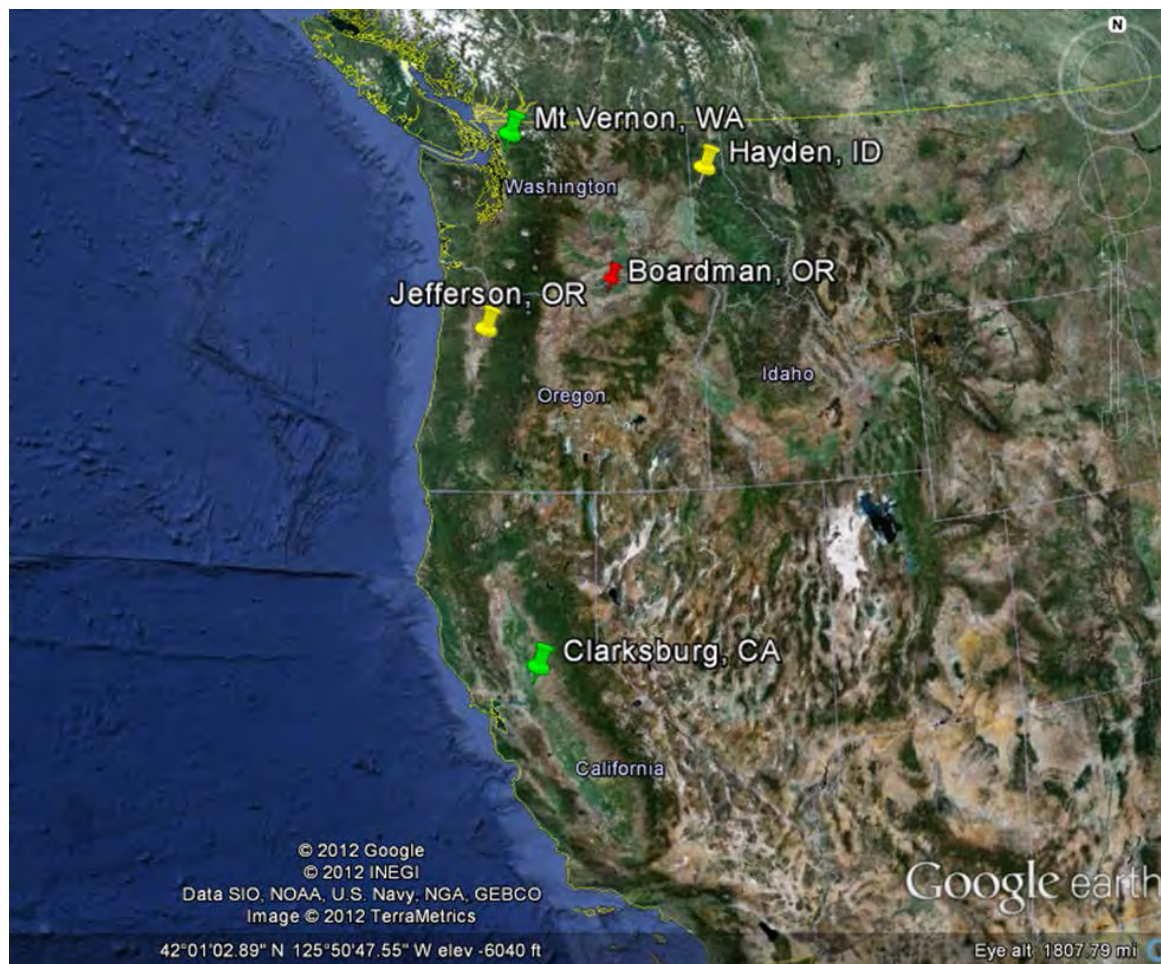
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AHB Phase I poplar demonstration farms - Objectives

- Quantify biomass yields
- Evaluate management practices
- Evaluate production costs
- Refine harvesting systems
- Pilot scale testing of selected genotypes
- Provide a testing ground for related research



AHB Phase I poplar demonstration farms - sites



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AHB Phase I poplar demonstration farms - sites

Location	Precip (mm)	Elev. (m)	Physiographic location	Soil	Topography
Jefferson, OR	1153	82	Willamette valley alluvial terrace	Clay loam	Flat to < 5% slopes
Hayden, ID	668	700	Hayden valley alluvial terrace	Silty loam with coarse gravel fraction	Flat
Clarksburg, CA	457	1	Sacramento valley flood plain	Clay	Flat
Mt. Vernon, WA	828	213	Cascades range piedmont	Clay loam with coarse gravel fraction	Rolling hills to < 10% slopes



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Replicated trials within AHB Phase I poplar demonstration farm sites

1. Evaluation of hybrid poplar clones for bioenergy use
2. Hybrid poplar biomass productivity trials
3. Preliminary evaluation of red alder inter-specific hybridization



Biomass productivity trials

- Full factorial, Split-plot design
 - Jefferson, OR
 - 2 Harvest seasons (Dormant, Active) whole plots
 - 2 Planting densities (2691, 5381 TPHA) sub-plots
 - 2 Alder intercropping (yes, no) sub-plots
 - 4 Replications (Clones), 132 trees/trt plot, 40 trees/measurement plot
 - Hayden, ID
 - 2 Harvest seasons (Dormant, Active) whole plots
 - 3 Planting densities (2691, 3588, 5381 TPHA) sub-plots
 - 5 Replications (Clones), 132 trees/trt plot, 40 trees/measurement plot



Biomass productivity trial (Jefferson, OR)

= Plot number; (int.) = alder intercropping; (No int.) = no alder intercropping



Dormant	10 x 2 (int.)	1	10 x 4 (int.)	2	10 x 4 (No int.)	3	10 x 2 (No int.)	4	Rep 1
	10 x 4 (No int.)	5	10 x 2 (int.)	6	10 x 4 (int.)	7	10 x 2 (No int.)	8	
Active									
Active	10 x 4 (No int.)	9	10 x 4 (int.)	10	10 x 2 (No int.)	11	10 x 2 (int.)	12	Rep 2
	10 x 4 (No int.)	13	10 x 4 (int.)	14	10 x 2 (int.)	15	10 x 2 (No int.)	16	
Dormant									
Dormant	10 x 4 (int.)	17	10 x 2 (int.)	18	10 x 2 (No int.)	19	10 x 4 (No int.)	20	Rep 3
	10 x 2 (No int.)	21	10 x 4 (No int.)	22	10 x 4 (int.)	23	10 x 2 (int.)	24	
Active									
Dormant	10 x 4 (int.)	25	10 x 4 (No int.)	26	10 x 2 (No int.)	27	10 x 2 (int.)	28	Rep 4
	10 x 4 (int.)	29	10 x 2 (No int.)	30	10 x 2 (int.)	31	10 x 4 (No int.)	32	
Active									



Site specific management practices

Jefferson, OR



Mt. Vernon, WA



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Year 1



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Year 2



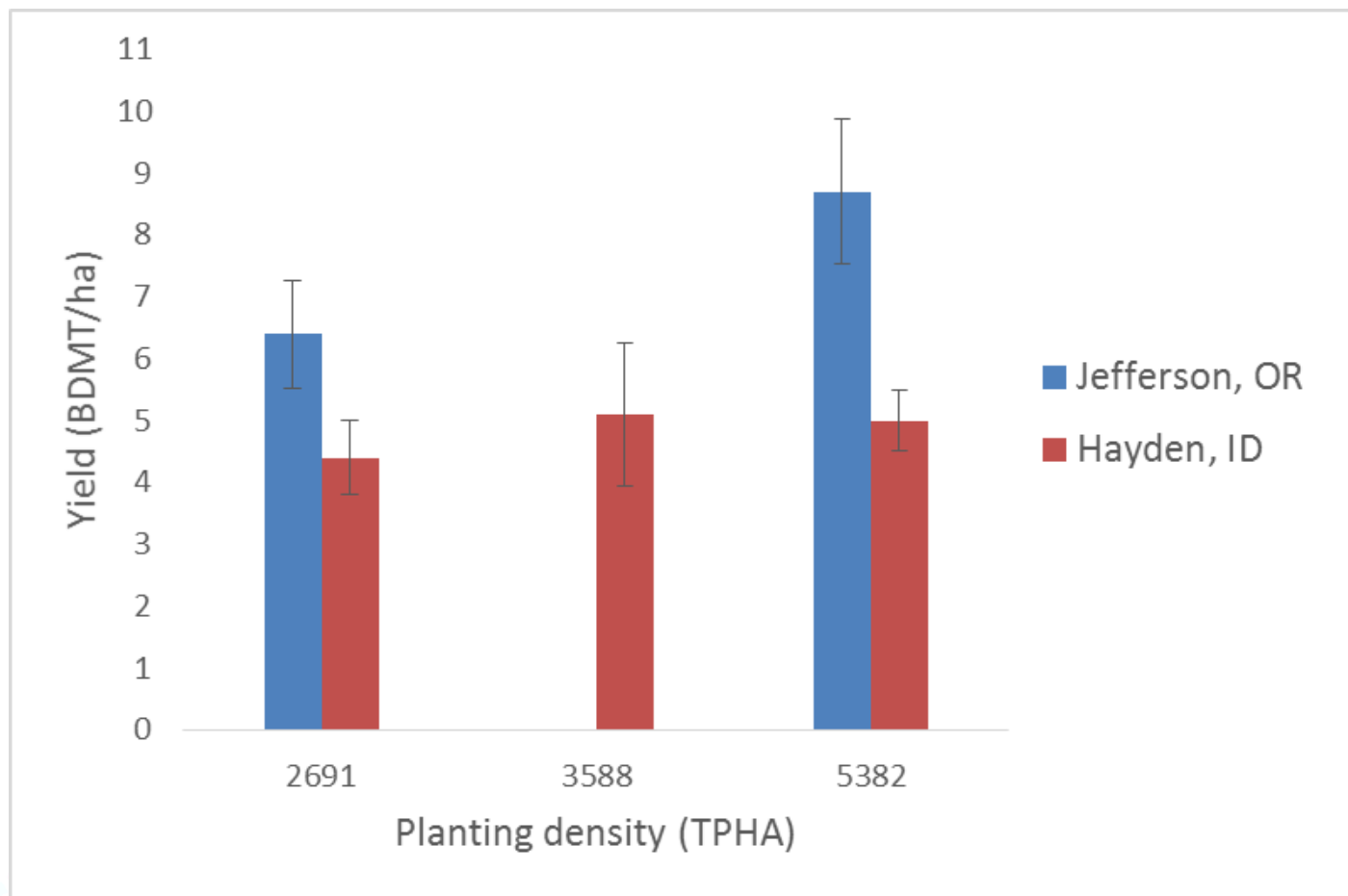
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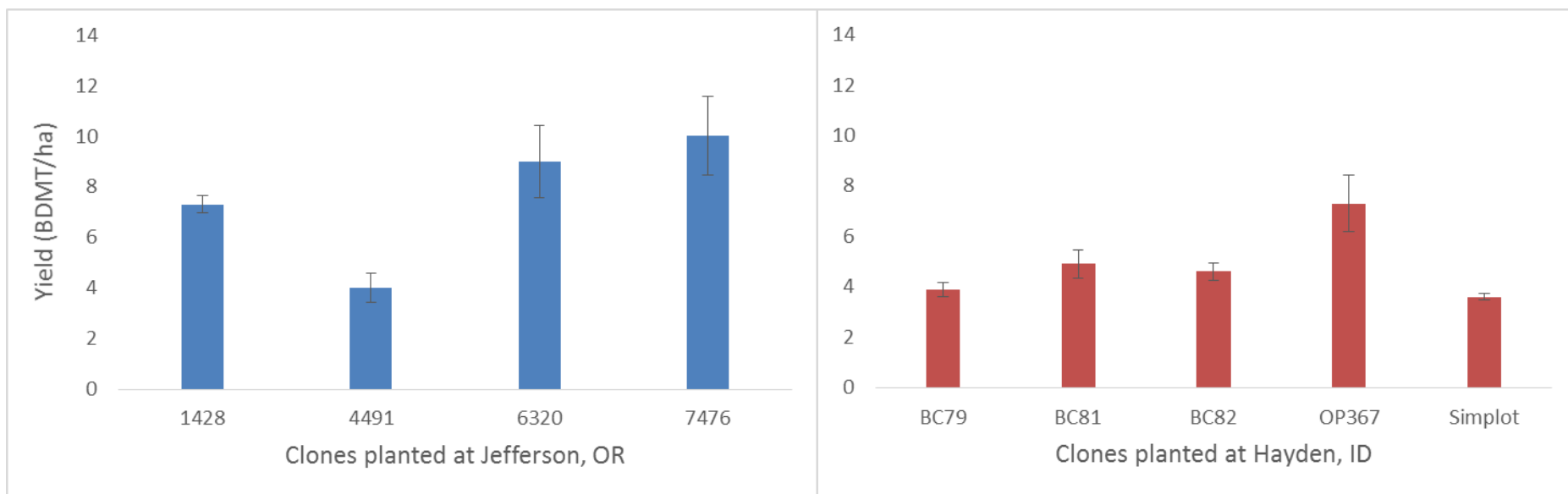
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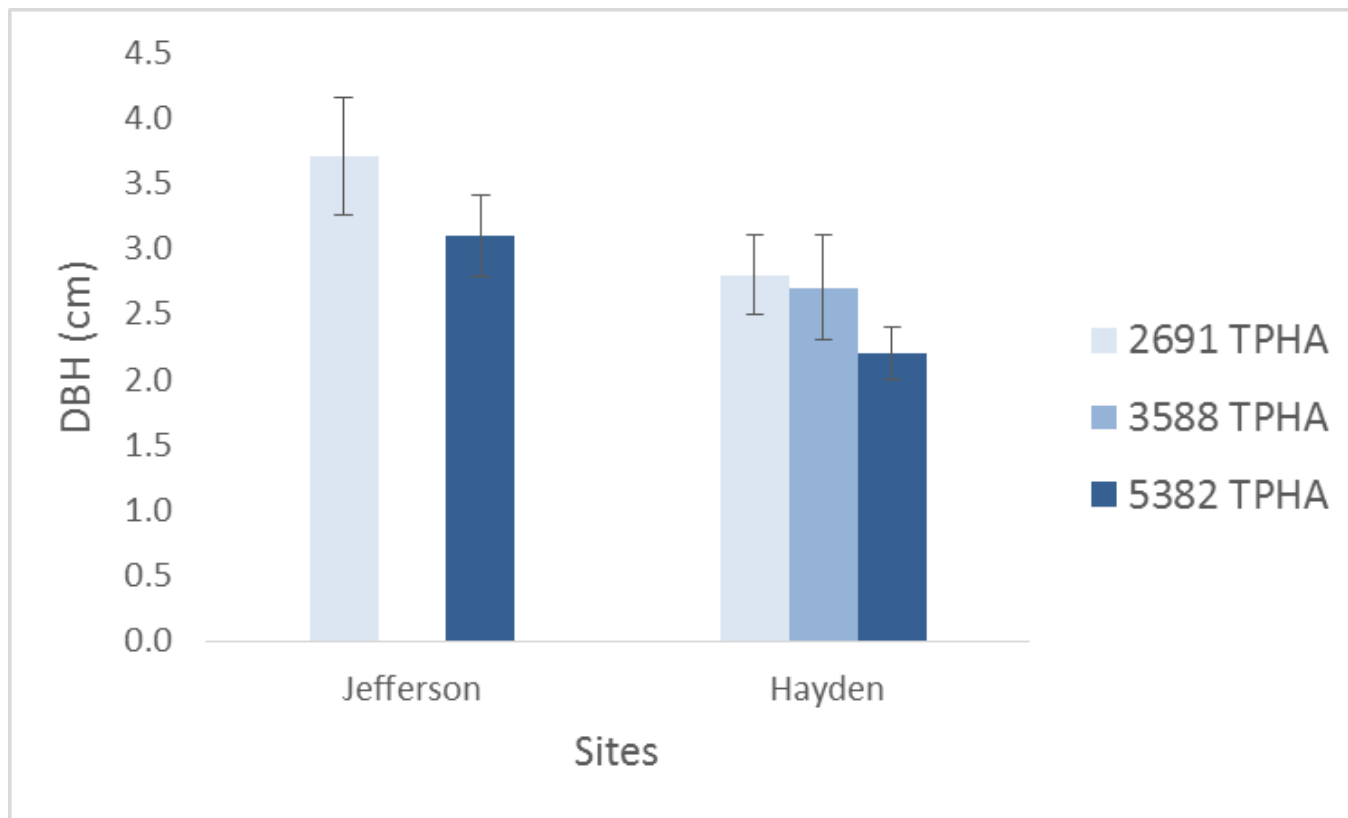
Yield by planting density after 2 years



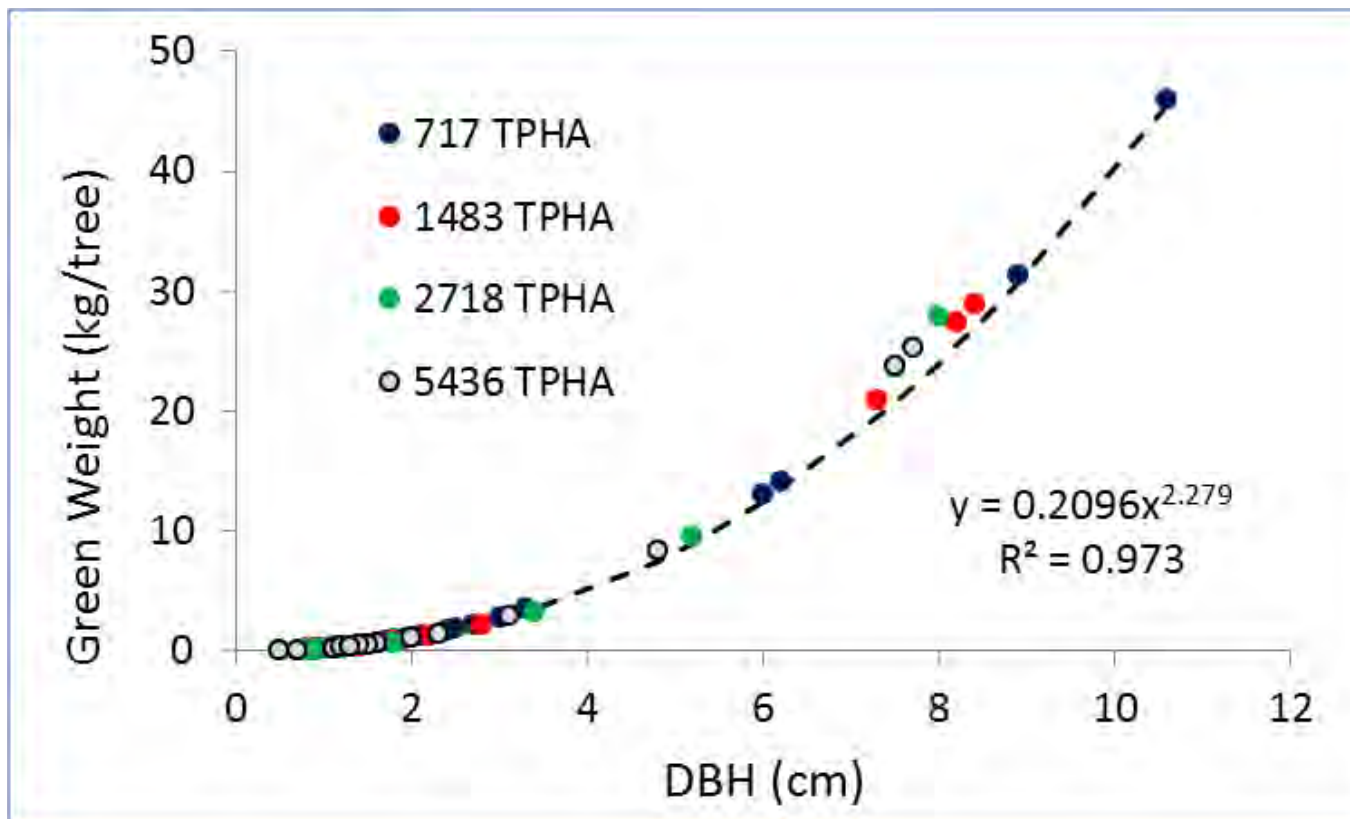
Yield by clone after 2 years



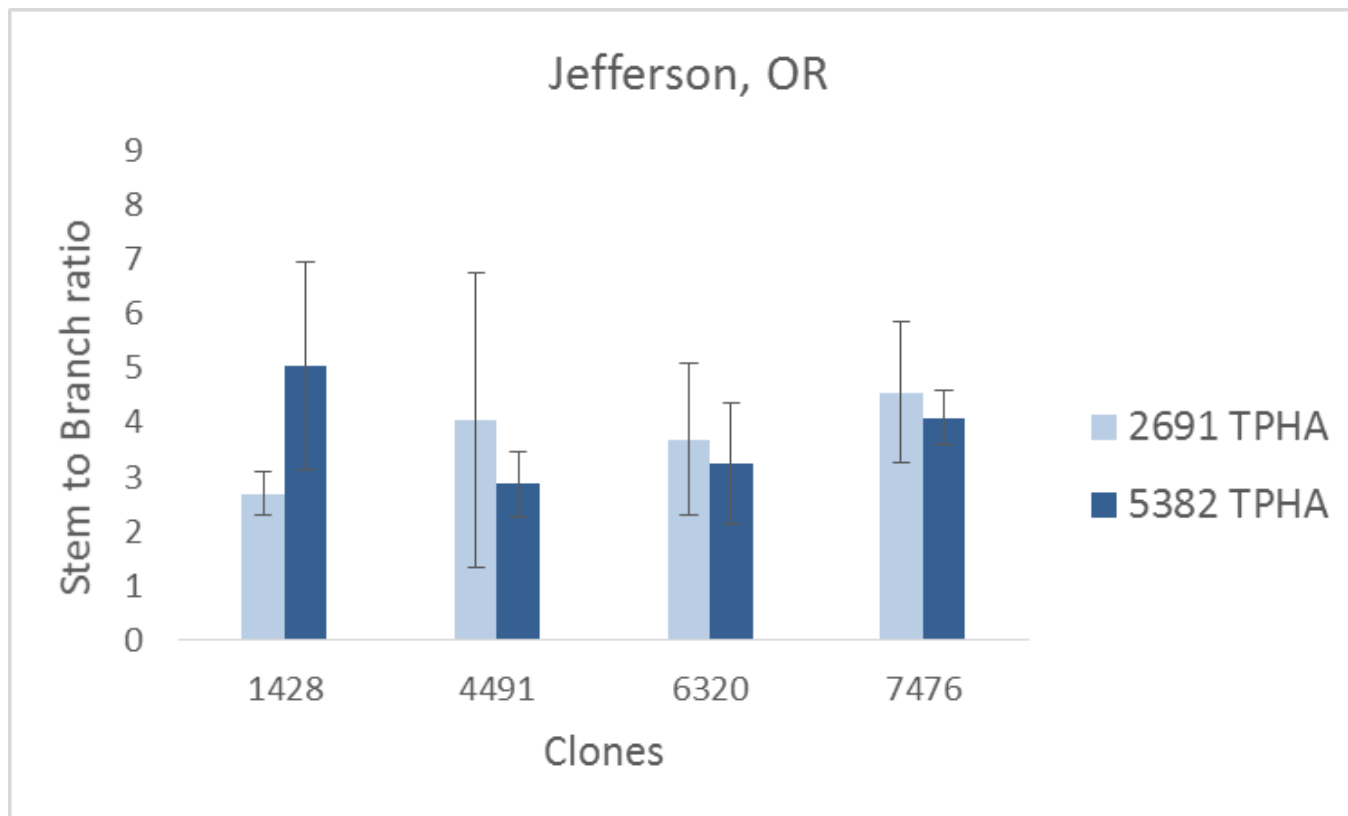
Planting density effect on diameter



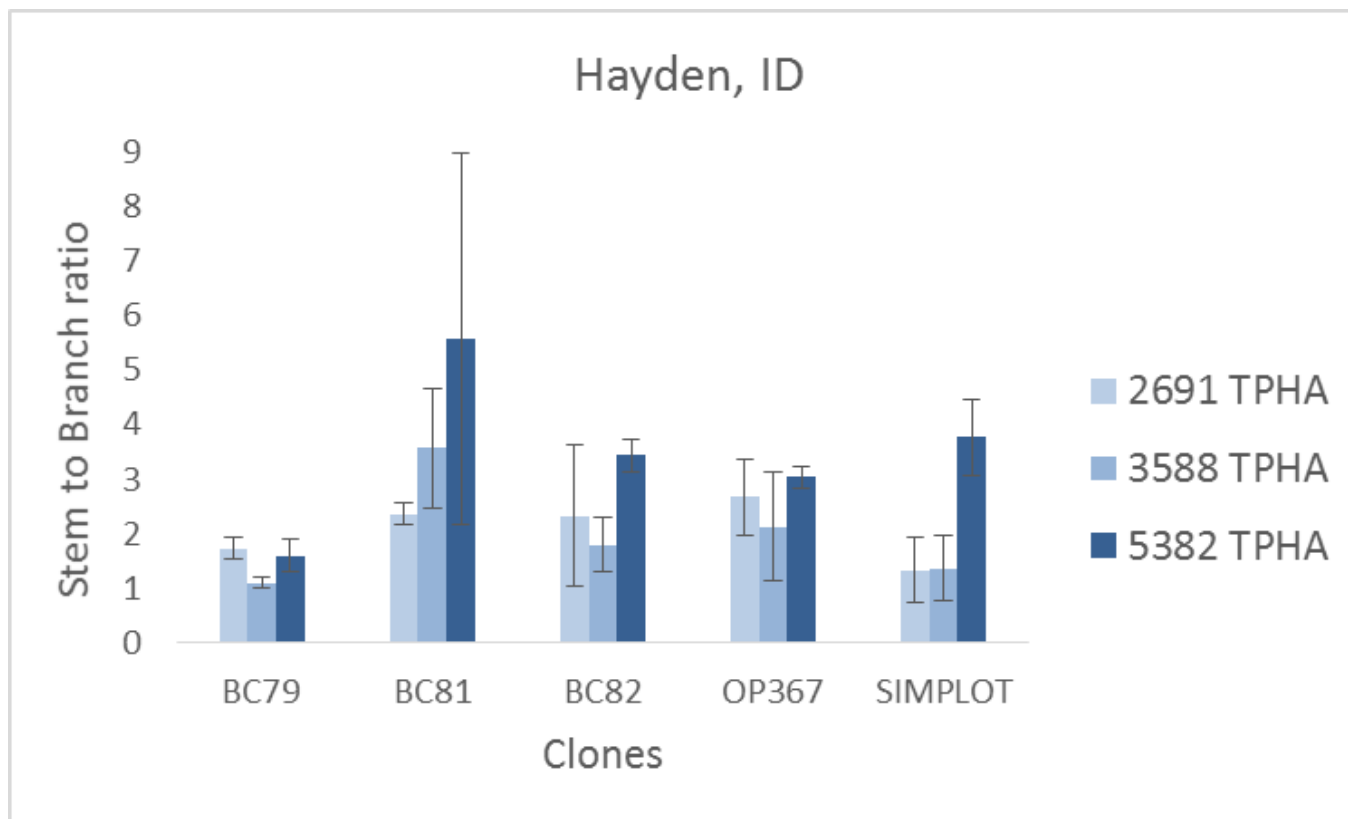
Quantification of Yields



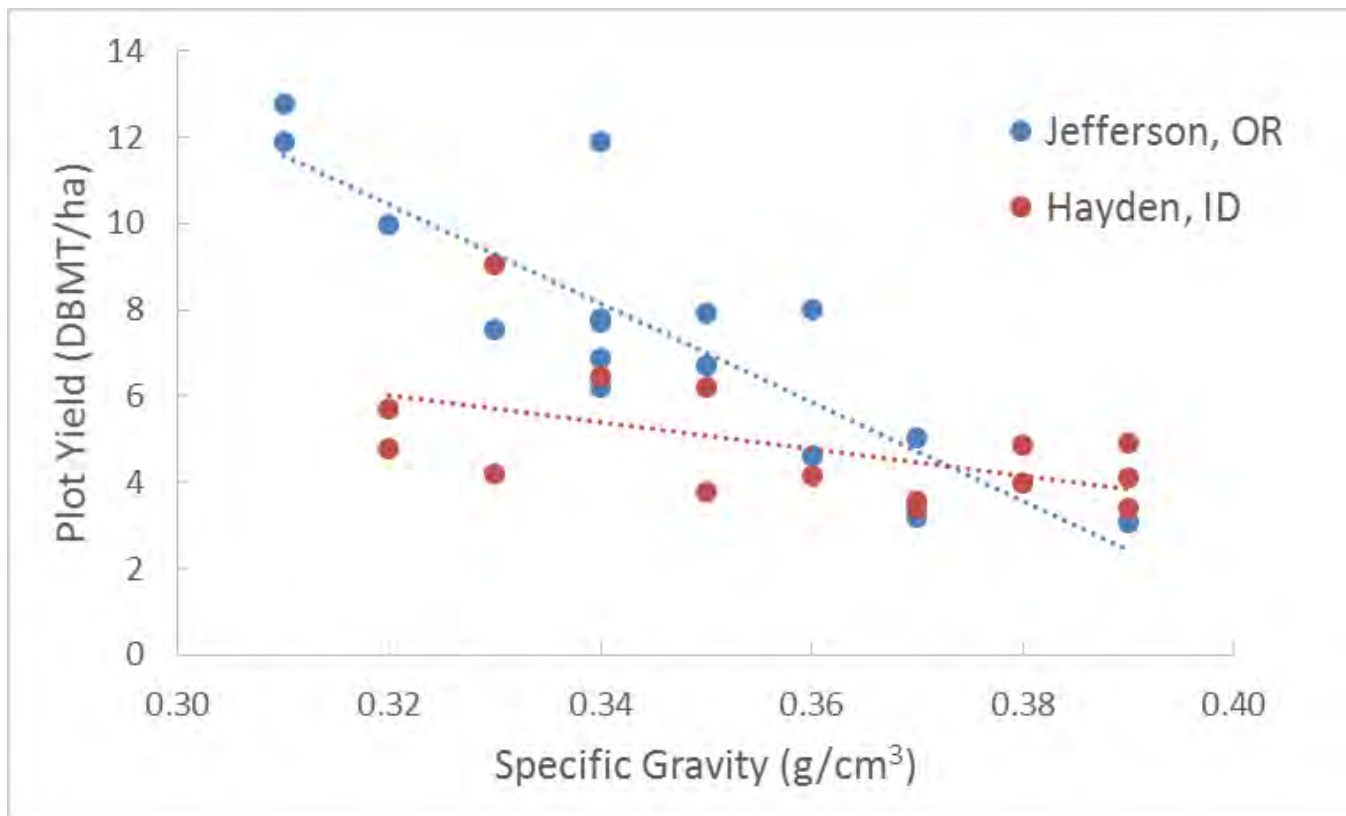
Stem to Branch Ratio



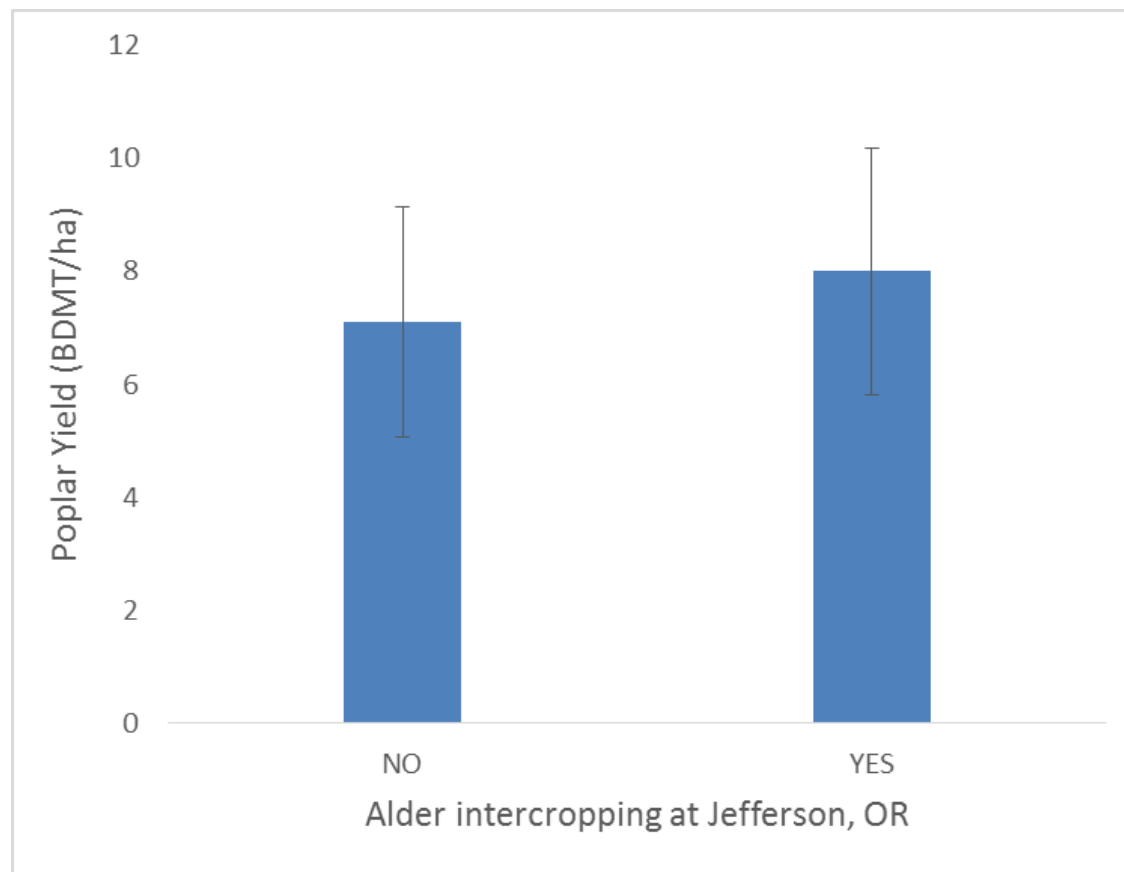
Stem to Branch Ratio



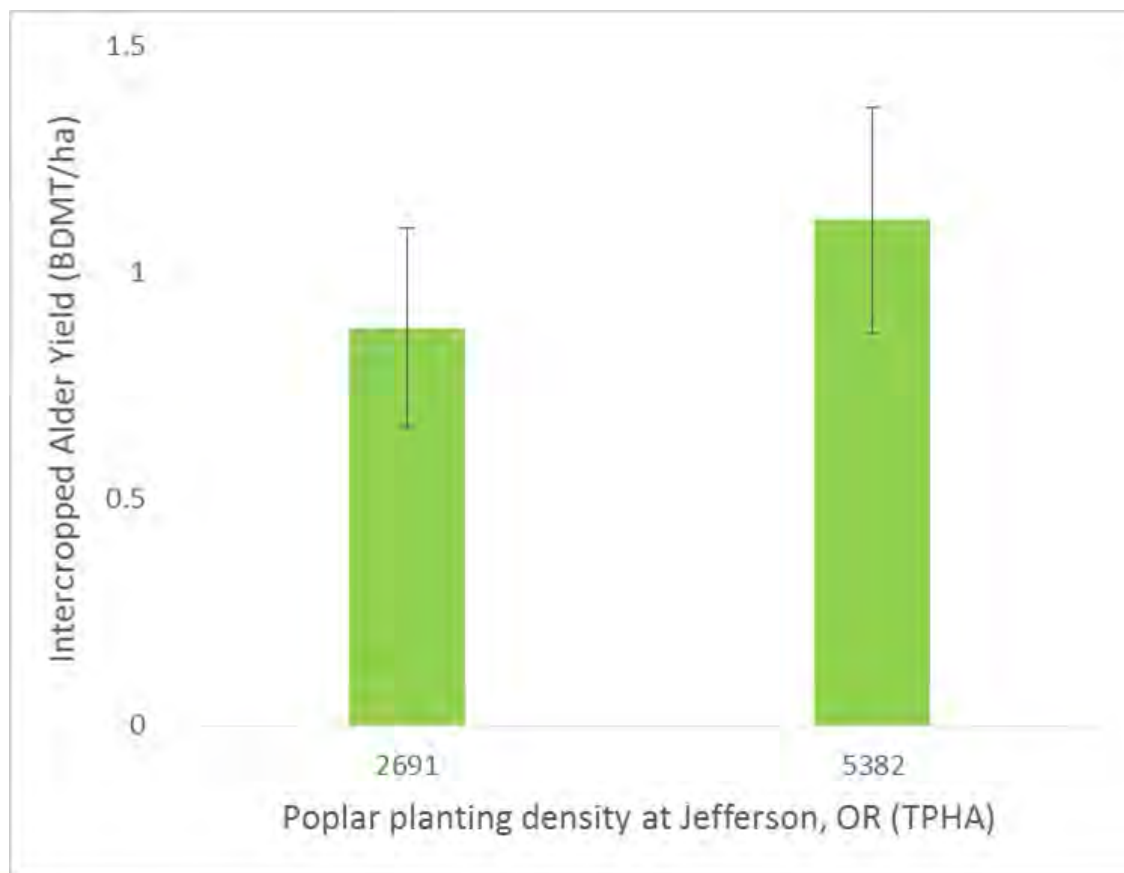
Opportunities for genetic selection



Effect of Alder intercropping on poplar yield after 2 years



Intercropped alder yield after 2 years



Conclusions

- Significant site differences in productivity
- Clonal selection is a key factor to increase productivity
- More trees = Higher yield (at more productive site, age 2)
- Density dependent diameter differentiation showing at this early age
- Greater diameter impact on yields achieved at DBH > 8 cm
- Higher planting density leads to higher wood:branch in some clones
- Clonal selection for specific gravity could potentially increase yields
- Alder intercropping not affecting Poplar productivity (adds 1 BDMT/ha)

