Coppice Forestry Research Trial Proposal

UVM Hort Farm 3/31/09

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This draft proposal outlines the potential configuration for hardwood coppice research trials to be carried out at UVM's Hort Farm. As the details can flex considerably based on the relative resources available, please note that I have generally included a range of options to provide a wide lens through which to consider the potential of this study.

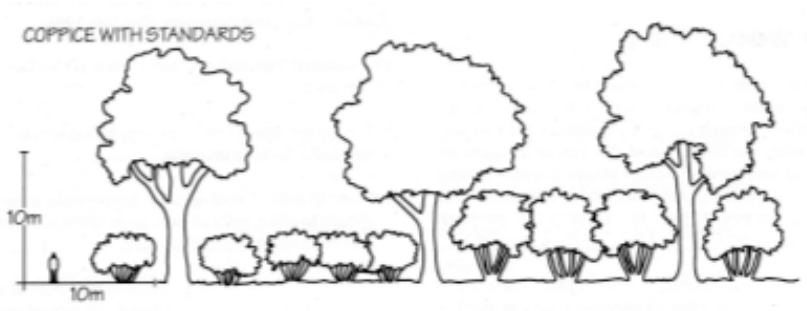
Definition: Coppice forestry is the intentional management and repeated cutting of broadleaf trees during the dormant winter season. This process has been actively carried out throughout the world for centuries (especially in Britain), sustaining industrial cultures for generations and providing a productive, sustainable form of permanent-cover forest management.

Space requirements

Research plots should be no smaller than 1/3 acre (approximately 105' x 105') and no larger than 1 acre each. Ideally, we would set up multiple research plots for each species combination - at least three replications per species/polyculture. I would suggest experimenting with at least 2-3 different species combinations.

Those that I believe would hold most promise include:

•**black locust coppice with black walnut standards** (standards are trees not managed as coppice stools but left as a long term nut and sawlog crop)



•**Oak - green ash - hazel** (oak standards, green ash and hazel coppice, providing both an upper and mid-story canopy). This is an adaptation of a traditional British coppice polyculture.

•and one monoculture planting - species depending on the desired products/uses. **Hickory, ash, black locust** all being excellent candidates given their multi-functionality as both high quality fuel and craft wood (with locust providing exceptional durability)

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Thus, these research trials would require somewhere between three and nine acres depending on the agreed-upon scope. Trees would be densely spaced on 7-10' centers.

Species selection is largely dependent on goals and potential products. As much as possible, coppice foresters work to add value to their pole wood on site before sale so as to maximize the earning potential. The species I've selected are based primarily on their recognized ability to regrow vigorously after cutting as well as a number of other functional uses that include -bendability/flexibility for weaving and craftwork, durability/rot resistance for outdoor applications including fence material and outdoor structures, shock absorbency and toughness for tool handles and other high-wear applications, hardness for furniture and toolmaking, density and BTU value for fuel and charcoal wood, figure and grain pattern/color for veneer and furniture wood, and additional non-timber uses including nitrogen fixation, pollinator habitat, medicinal uses, nut and fodder crops, etc. By selecting dynamic species that integrate well with one another and provide multiple yields and potential products, we stack maximum productive potential into our system.

Table 9b: LONG ROTATION COPPICE

SPECIES	MAIN USE	ROTATION	SPACING	No/hectare (acre)
Alder	Turnery	10-20 years	c. 3m	1100 (450)
Sycamore	Turnery	10-20 years	c. 3m	1100 (450)
Ash	Turnery, tool handles, rails	10-25 years	c. 3m	1100 (450)
Sweet chestnut	Fencing	15-20 years	c. 3.5m	800-1000 (320-400)
Birch	Turnery	15-25 years	c. 3.5m	800-1000 (320-400)
Hornbeam	Firewood	15-35 years	c. 3.5m	800-1000 (320-400)
Lime	Turnery	20-25 years	c. 3.5m	800-1000 (320-400)
Oak	Fencing	18-35 years	c. 4.5m	200-500 (80-200)
Mixed species	Fencing and firewood	15-20 years	c. 3.5m	800-1000 (320-400)

British chart depicting coppice species, use, rotation, spacing, etc.
Source: Woodlands - A Practical Guide. British Trust for Conservation Volunteers

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Irrigation requirements

It would be valuable to develop an irrigation system for newly planted saplings during the establishment phase. This may be a limiting factor and in turn, direct a phased installation of one plot per species combination per year over three years.

Cost involved

Establishment costs would include sapling purchase, planting, irrigation, tree guards (if deemed necessary) and necessary maintenance.

One acre of long-rotation coppice planted on 6-8' centers would require about 890 trees. 6-12" Black locust (*Robinia pseudoacacia*) bare root saplings cost $0.37 each from Cold Stream Farm (http://www.coldstreamfarm.net/pc-127-69-black-locust-robinia-pseudoacacia.aspx). Thus the trees for a one acre planting would cost approximately $330 plus shipping costs. Depending on available volunteer help, the planting would likely take between 2-3 days, requiring 15-25 hours of paid work for the project manager (at $20-$30/hr depending on crew size and project scope). This would result in an additional $300-$750 installation cost.

Trees Per Acre Chart

	1ft	2ft	3ft	4ft	5ft	6ft	7ft	8ft	9ft	10ft	11ft	12ft
1ft	43,560	21,780	14,520	10,890	8,712	7,260	6,223	5,445	4,840	4,356	3,960	3,630
2ft	--	10,890	7,260	5,445	4,356	3,630	3,111	2,723	2,420	2,178	1,980	1,815
3ft	--	--	4,840	3,630	2,904	2,420	2,074	1,815	1,613	1,452	1,320	1,210
4ft	--	--	--	2,723	2,178	1,815	1,556	1,361	1,210	1,089	990	908
5ft	--	--	--	--	1,742	1,452	1,245	1,089	968	871	792	726
6ft	--	--	--	--	--	1,210	1,037	908	807	726	660	605
7ft	--	--	--	--	--	--	889	778	691	622	566	519
8ft	--	--	--	--	--	--	--	681	605	545	495	454
9ft	--	--	--	--	--	--	--	--	538	484	440	403
10ft	--	--	--	--	--	--	--	--	--	436	396	363
11ft	--	--	--	--	--	--	--	--	--	--	360	330
12ft	--	--	--	--	--	--	--	--	--	--	--	303

Finally if we were to choose to purchase tree protectors, this additional cost would equal roughly two additional dollars per tree. The benefits of tree guards include protection from predation and increased stem temperatures which can lead to increased growth. Additionally, these guards could be reclaimed from this project and re-used for future plantings.

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Thus (a very rough and preliminary) per acre cost estimate for sapling and tree guard purchase and installation would be around $3000. If there is interest in this project, I will obviously carry out a more detailed budgeting survey.

Length of trials

These trials would ideally be carried out over a research term that spans 15-20 years. This is likely exceptionally long for most research trials, but long-rotation coppice systems are slow to establish, despite the fact that once in-cycle, they produce increasing yields for generations to come (200-400 years). The first cut would be staged after about seven years, once tree roots are adequately established. This would initiate the first stage of coppice regrowth. From that point on, poles would be harvested by clear cutting an individual cant (section of coppice) on a semi-regular cycle (5-15) years depending on the ultimate product desired. This research would ideally continue on long beyond this preliminary cycle, with repeated cutting again at regular intervals over the course of several decades. Any 'standard' trees (full size trees left to grow as long term food/nut production and saw log material) would not be harvested until having reached an ideal market size (60-100 years or more).

End results

After the establishment phase (the first 7 years or so), we would monitor total stand production in order to determine overall productivity of long-rotation coppice stands in the northeastern United States. This is a system that grows more productive with each rotation (until the specimens begin to slow in production and regrowth) so end results could be projected far into the future, though it would be far more useful to plan initial 'result' collection after the first real coppice cut at about 12-15 years after planting. This polewood would the be used for value added product material including craft wood, durable outdoor construction material, fence posts and other related enclosure material, charcoal and bio-char production, lumber, cordwood, etc.

Any spraying needed – half the farm is now organic

This system would be managed as an organic, no-spray installation. Aggressive weed competition will be controlled by mechanical methods including mowing and scything.

Care needed and who would provide this

Primary care will involve irrigation during the installation phase and weed control, again, most critical during the early phase of growth and development. Depending on the project budget, I would be able to provide some of this management though I would also likely pursue a research assistant/graduate student or intern to help with this maintenance. As it is a long term project, I would assume responsibility for the long term care of the research plots.

For additional information and scope, please contact me, Mark Krawczyk at
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