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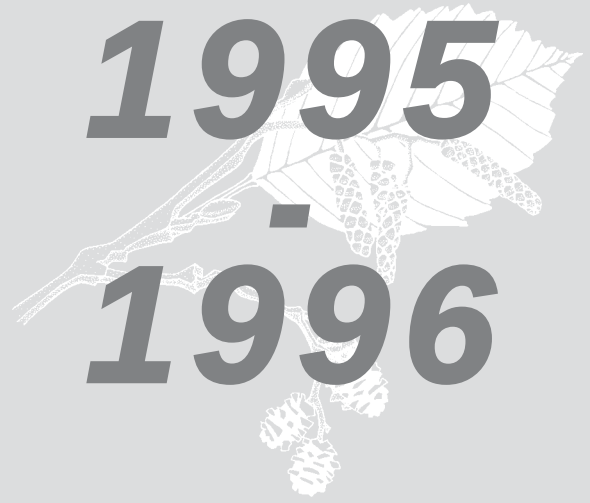
June 1996

Hardwood Silviculture Cooperative

Annual Report

1995 - 1996



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HIGHLIGHTS OF 1995-1996

- Establishment of new installations was slow: 1 each of Type 2 (variable density) and Type 3 (alder/Doug-fir mix) installations. We learned the important lesson that early fall frost can be very hard on unprotected alder seedlings.

- Permanent plot installation and third-year measurements were made in 3 Type 2 installations. In addition, 6th year measurements were taken in 1 Type 1 and 3 Type 2 installations.

- Thinning and pruning was done in 5 Type 2 installations.

- The maple seedling quality study is into it's second growing season. First-year growth was slow across all five study sites. Die-back, largely related to nursery conditions, was common.

- Draft sampling protocols for tracking stem form, crown size, and branch pruning and occlusion were developed.

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INTRODUCTION

This report summarizes the activities of the Hardwood Silviculture Cooperative during its ninth year. The current emphasis of the Cooperative continues to be on the management of red alder for timber production, biodiversity, nitrogen fixation, and as an alternative species to conifers in areas infected with laminated root rot. We are also entering the second year of a study of bigleaf maple regeneration.

The Red Alder Stand Management Study continues to be our highest priority. While we have been making great progress over the last several years to complete the sampling matrix for Type 2 (variable density) installations, this year produced no net gain (23 of 30 in). A bad nursery freeze and slower than planned logging were the culprits. A consequence is a heavier than usual planting schedule next spring. Six of the nine planned Type 3 (mixed alder/Douglas-fir) installations are also in the ground. Several plantations have had their 6th year measurements and had pruning treatments installed. And now that we have older plantations, we are upgrading form/log quality sampling protocols.

The second research priority of the HSC is a study of the regeneration of bigleaf maple. This study was designed to identify the characteristics of the target maple seedling, the seedling that grows the best on outplanting. The study was installed on 5 sites in Oregon and Washington to determine if site conditions affect the “target.”

Over the last year, the HSC has worked with the Pacific Northwest Tree Improvement Research Cooperative and the Pacific Northwest Research Station to develop a regional study of alder genetics. The study objectives are to better characterize the geographic patterns of genetic variation (the basis for both seed transfer guidelines and tree improvement programs), amounts of within and among family variations, and importance of local, microsite (slope vs riparian) conditions to genetic differences. Seed collections could begin in the fall of 1996.

The following report reviews in more detail the activities of the Coop and the progress with these major projects, as well as related research by HSC staff on alder and other hardwoods.

ORGANIZATIONAL ACTIVITIES

SUMMER MANAGEMENT COMMITTEE MEETING - JULY 1995

The Management Committee met on July 20, 1995 at Oregon State University, with a field trip the following day. The meeting on the 20th began at 1:00 PM with introductions. Karl Buermeyer discussed progress on the Red Alder Stand Management Study. Planting season in the spring of 1995 included filling in holes in 1994 plantations, due to mortality, and planting four new Type 2 (variable density alder plantations) and one new Type 3 (mixed alder/Douglas-fir plantation) study site. Interplanting went well, stock was generally excellent. Stock for two of the new sites was poor (undersized) to variable. The other two Type 2 and the Type 3 sites had good sized stock (Webster and Wind River Nurseries), although an apparent lifting or storage problem resulted in most of the Wind River stock dying. Two planned Type 2 and two Type 3 installations were delayed until 1996 due to incomplete logging or site preparation, and in one case, nursery stock falldown.

With two Type 3 sites to be planted in the spring of 1996, we have seven of the nine sites targeted. There were no volunteers for the remainder of these sites at the meeting.

Other topics discussed relating to the Red Alder Stand Management Study included planned thinning treatments. These will be discussed further in the section of this report updating this study

A pruning protocol for the one pruning treatment in the Red Alder Stand management study discussed at our April ad-hoc meeting was finalized:

1. 5-6 ft. lifts will be targeted, to a total of 22 ft.
2. Branches should be less than 1/2 inch in diameter.
3. Lifts will be limited to ensure that 60% live crown is maintained.
4. The first lift will be conducted when 90% of the trees can receive a 5 ft lift while maintaining 60% crown cover (12.5 ft, 3.8 meters total height).

All plantations prior to 1992 should be ready for the first lift this coming dormant season ('95-'96). It was decided that all blocks that receive a treatment (thinning or pruning) should be measured during the same dormant season to provide baseline data.

In addition to the pruning treatment as part of the Stand Management Study, the Coop is considering a study to examine the effects of different levels of pruning on tree form. Preliminary proposals have been developed by Jerry Hoyer of the Washington DNR.

Steve Dickerson of Diamond Wood Products (now Northwest Hardwoods) gave a timely and informative presentation on the problems he has had in operational and research related planting of red alder. Unique problems with planting red alder (as compared to planting conifers) center around the necessity of getting the trees growing quickly from the outset. If chemical vegetation control is used, it cannot be followed up after planting, as herbicides are not very selective between weed and hardwood tree species. Good sized (20 inches or greater, 7 mm in diameter), healthy seedlings that are well nodulated will be best able to get above the competition and achieve good early growth and form required by red alder. Also noted was the high incidence of damage to seedlings in bags following removal from freezers. Steve recommends removal from the freezers and shipping no sooner than 7-10 days prior to planting. As we touch on at every meeting, we need to find ways to communicate our needs to nursery managers to improve the quality of the planting stock we get.

A idea originated by the Pacific Northwest Tree Improvement Research Cooperative, to conduct a common garden study of variation in red alder in a large number of seed sources from northern California to British Columbia, was presented. Expected results would be a better understanding of geographic seed zones and transfer between these zones, and possibly some preliminary information toward tree improvement work. This study would be jointly organized by the PNWTIRC and the Hardwood Silviculture Cooperative. There was enough interest among the group, pending cost estimates, to proceed with a concrete proposal. This will be developed by Tom Adams of the PNWTIRC.

Alison Luckett presented preplant and early outplant data taken from five sources of bigleaf maple seedlings in our maple regeneration study. Parameters measured include tree morphology, vigor and damage indicators. In general, the seedlings with the least nursery damage were fall sown as opposed to spring sown.

Dave Hibbs presented last year's income and expenditures. We were a bit over budget on the Bigleaf Maple study because we expected to only be collecting seeds, rather than the outplanting study we ended up conducting.

This year's budget was presented, with very little change from last year's. Slight increases in costs were offset by increased membership. The budget was approved by the group.

Most members present at Thursday's meeting went on the field trip Friday. The first stop was a Bigleaf Maple Study site near Toledo, OR, where differences in seedling morphology and performance were observed. One surprising observation was how limited the browsing damage was, despite the fact that leaves and stems were protruding from tubes. Even some untubed seedlings were still alive, although definitely browsed.

The next stop was the Toledo Type 2 alder site, now in its fourth growing season. We observed the results of fork removal, conducted last winter, and could relate field conditions with the previous day's discussion of pruning.

The trip wound up at a new alder/Douglas-fir replacement series (Type 3), planted in 1994. Some dead alders had been replaced, and the Douglas-fir had been tubed this spring, following heavy deer browse last season. These appeared to have been making a good recovery.

Winter Management Committee Meeting - January 1996

The Winter Management Committee Meeting was held in Bellingham, WA, January 9 & 10, 1996. Following introductions, around 9:00 AM on the 9th, Alison reviewed the progress of the Bigleaf Maple Study. Last year's measurements by site and seedling lot were presented. One notable result was the overall "shrinkage" (final seedling height less than initial) for most seedling lots. Since there was dieback of seedling tips in the nursery, Alison will separate out nursery dieback to see how much of the dieback occurred following planting. In one seedling lot, there was also a small negative diameter growth increment. This is believed to be due to a deeper field planting depth than the original nursery bed depth.

Dave Hibbs reviewed the Alder Pruning Study proposal. This study as designed by Jerry Hoyer would involve pruning trees to three levels,

defined by percent of the tree height left in live crown, 12 trees in each pruning level in each of two planting densities, plus 12 control trees in each planting density. Buffer trees will be pruned to 65% live crown. There was some discussion about whether this would be an adequate sample size. After discussion of the alternative, a large scale ($20,000 - $30,000) study, it was decided to go ahead with this study using volunteer labor from coop members, to get as much information as possible until we decide to do a full scale study sometime in the future.

In the afternoon, the field trip visited two of our oldest variable density (Type 2) Alder Stand Management Study sites. At Humphrey Hill (seven years old), the group looked at plots thinned at two different timings and our first pruning effort (pruned to 11 feet). It was noted that there was quite a bit of swelling around the branch stubs, and some concern over the implications for wood quality.

The Clear Lake Hill site is 6 years old, and has quite a bit of *Septoria* (fungus) infection, in various degrees, from superficial blisters to deep cankers. We will observe the progress of these trees to determine the long term implications, and compare the incidence to other similar sites to see if there are high risk factors.

Wednesday, the meeting began at 8:00 AM with a quick review of the progress of the proposed Alder Genetics Study. A study proposal will be presented at the summer 1996 meeting.

Karl Buermeyer reviewed the Alder Stand Management Study. Three of the four new Type 2 installations that were planted in 1995 appear at this point to be successful. One had to be interplanted in 1996 with plug seedlings where open bed root systems proved too large to plant in the rocky soil. The fourth site, on the Gifford Pinchot National Forest, was a good site, but only about 20% of the seedlings broke bud and survived. We are looking into possible causes for the nursery or storage death of the seedlings. The site will be slashed and replanted in 1997.

A new alder/Douglas-fir replacement series was installed near Menlo, WA. The area had generally good survival, but some holes were interplanted in the spring of 1996.

Dave Hibbs then reported on the meeting held near the end of November to discuss the future needs for Stand Modeling so that results

from the Red Alder Stand Management Study can be compiled. At this meeting, we discussed with Dave Hann and Dave Marshall of OSU the data we were currently collecting. They suggested some additional data that would be needed, and how to subsample the height trees we are currently measuring. Hann and Marshall also outlined the data cleaning and modeling procedures, and some potential costs for these services. Hibbs is currently looking into funding sources.

Based on the results of the November meeting, the attendees of the current meeting discussed first the height sampling procedures and additional data we need to collect. This will be discussed in more detail in the following section on the red Alder Stand Management Study.

Finally, the need was expressed to identify areas where certain tree characteristics, such as tree form and diseases, are prevalent so we know where it may be risky to grow alder. The data we are collecting in our study areas will go a long way toward answering this. We could perhaps supplement with existing inventory data and extensive visits to existing alder stands.

Wednesday's field trip visited a new Type 2 plantation near Darrington on Washington DNR land. First-year growth and survival was excellent here although grass invasion, a potential problem, is already beginning. There is also concern that the site is on a river bench and so could be prone to frost damage. The consensus was that not much could be done about either of these issues; we will be watching its progress carefully for the first few years.

COOPERATIVE RESEARCH

RED ALDER STAND MANAGEMENT STUDY

We suffered a major setback in our attempt to complete our matrix of 30 variable spacing alder (Type 2) plantations in 1996. Logging delays and unavailability of stock postponed three of seven needed sites. An early frost killed the most of the 1996 alder seedling crop, so two more proposed sites were without stock. With the loss of another site due to a company buyout and subsequent shift in priorities, and the 1995 failure of the Gifford Pinchot National Forest site because of a stock problem, we will need to plant seven sites in 1997 to achieve our matrix of 30. At this time, three sites are laid out and ready to plant- the 1995 Gifford Pinchot site is to be slashed and replanted, and 2 new sites on Oregon Department of Forestry and former International Paper land (the latter being contingent on the maintenance of IP/Roseburg Forest Products' research direction). A site on Oregon State University Research Forests will be laid out when logging and site preparation is complete. Coast Mountain Hardwoods has two sites committed pending completion of logging, and assuming the sites are appropriate for the study areas. This leaves one site still uncommitted. Figure 1 shows the location of all established and committed sites in this study.

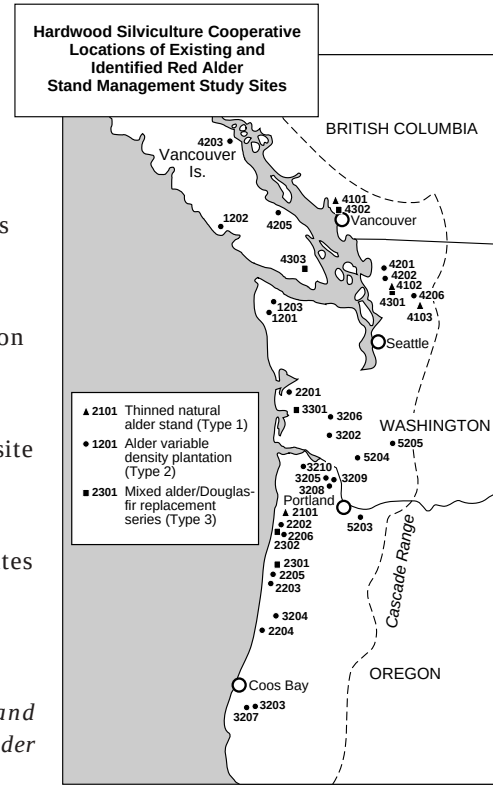

Figure 1. Location of existing and committed sites in the Red Alder Stand Management Study.

Stock was available to plant one new Type 2 site in 1996, on Washington Department of Natural Resources land, near Forks. The stock, from Brooks Nursery near Salem, OR, had some frost damage, but was culled during sorting and again by the planters. With our built-in 20% overplanting, stocking will be adequate if those trees appearing to be healthy remain healthy. Assuming the success of this site and the ones that appeared successful in the fall of 1995, our count of Type 2 sites remains at 23 of 30.

One of the last two committed Type 3 (red alder/Douglas-fir replacement series) sites to be planted in the spring of 1996 was not planted because of incomplete site preparation. Slash piles that should have been burned were not, leaving no room for the study blocks. A site on the Hebo Ranger District, Siuslaw National Forest was planted, bringing our total to six of nine originally planned.

Five Type 2 sites received the first thinning and first pruning lift this winter; two are six years old, two are five years old, and one is four years old. Measurements taken in the winter of 1995-96 include 3 yr measurements on three Type 2 installations, 6 yr remeasurements on three Type 2's and the 6 yr remeasurement of one thinned natural stand (Type 1).

Some adjustments in our treatment and measurement protocols were made at the two Management Committee meetings and an ad-hoc technical meeting over the past year. Some questions on how to deal with tree bending and breakage when thinning from 1200 trees per acre to 230 trees per acre, and how to deal with sites having less than the full compliment of treatment blocks, were discussed at the ad-hoc meeting in April of 1995. It was decided that while thinning from such a high density may result in some damage, as it did the first time we tried it, in other cases (where trees grow more slowly) it may not. The only way to learn is to stick to our original treatment plan, rather than go to a two stage thinning as proposed.

Some installation sites are missing a treatment. It was decided that each installation should always have an unthinned control for each planting density at each site and that, among installations that would be missing a treatment, the omitted treatment would differ at each installation. If all the sites remaining to be laid out have the full

compliment of treatment blocks, then we should have 26 replicates of each of the thinning treatments in the 1200 tree per acre planting density for the 30 sites. Other planting densities have more complete sets of treatment blocks.

Our original protocol stated that at and beyond the 6 year remeasurement, we will select a subsample of 40 trees in each plot to measure height and height to live crown. These 40 trees are selected from crop trees, evenly distributed over 1" diameter classes (the same number from each diameter class over the entire range). Based on the suggestions of stand modelers who will be analyzing and modeling our data, and of Rod Meade of Weyerhaeuser, the procedure was modified as such:

We will select 40 trees over the range of diameters as before, but will add to that any remaining trees in the largest and smallest diameter classes after evenly distributing them. In addition, we will sample heights on the largest 15 trees in the plot if not already included. To attempt some continuity of sample trees over time, crop trees will be preferred as height trees, supplementing with non-crop trees as needed to satisfy the distribution. Crop trees will be re-selected at each remeasurement to insure the best quality trees over time.

Form and quality measurements will also be needed. Currently we are recording:

- Fork
- Lean
- Curve
- Death and Damage Agents

Addition information we will be collecting may include:

- Age at Breast Height
- Limb Death, Shedding and Occlusion
- Index of Sinuosity
- Lumber Grade in the Butt Log
- Crown Diameter
- Numbers and Distribution of Limbs
- Form Measurements and Crown Characteristics

Age at Breast Height and Limb Occlusion can be collected on a subsample of trees when the stand is young. The next four characteristics could be taken on the height measurement subsample, and the last will be obtained through destructive sampling in portions of the study blocks already reserved for that purpose. Protocol for collecting this information is being developed, and will be presented in draft form and discussed at the 1996 summer Management Committee meeting.

Regeneration of Bigleaf Maple

The bigleaf maple regeneration project was proposed in August of 1994 to answer some basic questions about seedling quality and early growth performance of ***Acer macrophyllum*** (Pursh.). Specific questions of interest were :

1. Are there specific morphological attributes associated with vigorous, fast growth trees?
2. Do the seedlings with these characteristics do better across an environmental moisture gradient?
3. What is the comparative success of various seeding techniques at producing the identified characteristics?
4. Does animal control contribute significantly to seedling survival?

The goal for this study is to develop nursery seedling quality criteria. The end product will be a guide of easily identifiable characteristics that will be generally applicable regardless of seedling source. It is believed that the establishment of a seedling quality criteria will contribute to the likelihood of success for the large scale seed transfer study in the future.

For this study, 1600 one year old bigleaf maple seedlings were donated by: Weyerhaeuser Company, ODF-Forest Grove, and PNW-Forest Sciences Laboratory. Each seedling is tracked by its tree lot and tree number. Tree lots are identified by nursery and the seed source. The following is a summary of each tree lot:

AWFD - Weyerhaeuser seed source; zone 241, collected in September and October of 1993. No stratification took place. Seed was sown in to the nursery bed on December 27, 1993. Bed density was

sown for 50% germination rate. Inventory at lift on Feb. 28, 1995, was 8,000 total live trees, which equals a bed density of 16 trees/square foot.

AWSD- Same seed as AWFD except it was stored for 5 months. On March 17, 1994, it was stratified and refrigerated until May 18, 1995. Germination test showed a 24% decrease of seed viability after storage and stratification. Seed density was sown for 50% germination rate. Inventory at lift on Feb. 28, 1995 was 3,100 total live trees, which equals a bed density of 9.1 trees/ square foot.

AOFD- Wildcat Mountain Road, seed zone 052 at 800 feet. Seed was not cleaned or stratified prior to planting on October 15, 1993. Bed density was sown for 50% germination rate. Inventory at lift on Feb. 27,1995 was 4,800 total live trees, which is 14.8 trees/ square foot.

AFT- PNW Forest Sciences Laboratory seed source, zone 241, collected October 1993. Seed was stored for 5 months. On March 9, 1994, seed was stratified and then refrigerated until May 4 1994, at which time the refrigerator malfunctioned causing some seeds to mold and prematurely germinate. As seeds germinated they were transplanted to Jiffy Pellets. Germination was spread over several weeks. Seedlings were kept in a greenhouse where they received 10-12 hours of supplemental lighting. Seedlings, including germinates only a few days old, were transplanted to Aurora Nursery on June 10, 1994. Bed spacing was 6”x 6”, 6”x12_, 12”x12”.

EOFD- Wildcat Mountain Road. Seed zone 052 at 800 feet, collected October 1993. It was stored for two weeks with no stratification prior to out-planting on November 10, 1993. Bed density was 17.5 trees/ square foot.

All tree lots beginning with the letter A were grown at Weyerhaeuser Aurora Nursery. The AWFD, AWSD, and AOFD tree lots were propagated under Aurora_s standard oak regime in which two applications of 15 pounds/acre nitrogen was put on in July and August 1994. Nursery beds were undercut 10” in early June 1994. Beds were watered in the morning 4 to 5 times a week. Trees were lifted Feb. 28, 1995.

The AFT tree lot had three applications of 30 pounds/acre Nitrogen in July, August and September 1994. This tree lot had the same watering

regime and lift date as stated above. Temperatures of 14° F on Feb. 14, 1995, caused top damage to about 60 percent of trees in all tree lots at the Aurora Nursery.

EOSD tree lot was grown at Phipps-Elkton USFS Nursery. Bed moisture was maintained at 10 to 20 centibars through germination phase. After August 1994, the bed was watered only when soil tension exceeded 60 centibars. First week of October watering stopped. The bed was undercut 11" in September. 250 pounds/acre of fertilizer N21-P0-K0-24 Sulfur applied in October. Trees were lifted on Feb. 17, 1995 at which time they were erroneously graded. They were then moved to Aurora on February 28, 1995, for nursery measurement. The following is the grading protocol used by Phipps:

	Maximum	*Minimum*	*Mean*
Height	***99 cm.***	***20 cm.***	***66.1 cm***
Diameter	***11 mm.***	***3 mm.***	***7.6 mm***

320 trees were randomly selected to represent each tree lot. On each tree morphological characteristics such as: height, diameter, terminal bud condition, root volume, and fine root network were recorded.

These 1600 trees were then divided into five groups for out-planting at five study sites. Each study installation has 64 seedlings from each tree lot, of which 60 are protected with Vexar tubing, for a total of 320 trees at each installation.

Each installation site is approximately 1/4 acre in size. Installation sites were chosen based on environmental gradient, as well as land owner commitment to plant and provide continual site management. Trees were randomly assigned planting spots with the objective of achieving interspersion of tree lots. The following is a summary of the five installation sites:

1. BLM508- Cascade Foothills, Washington. Seed Zone 430.
2. BLMc200- West-side Coast Range, Washington. Seed Zone 030.
3. BLMceres- East-side Coast Range, Washington. Seed Zone 241.
4. For Grove- Northern Oregon Coast Range. Seed Zone 052.
5. Pioneer- Central Oregon Coast Range. Seed Zone 061.

During the 1995 growing season all trees at all five sites were subjected to two sets of measurements. In June of 1995, just after bud break, a vigor assessment was done. And in December of 1995, growth data was collected. The total number of dead trees for 1995 was about ten percent of the 1600 total trees in the study.

	Tree Lots										
	AWFD		AWSD		AOFD		AFT		EOSD		Row
	June	Dec	June	Dec	June	Dec	June	Dec	June	Dec	Totals
Sites											
BLM508	2	1	3	2	0	4	0	0	2	0	**14**
BLMc200	3	2	29	2	24	4	0	1	5	2	**72**
BLMceres	1	0	1	2	12	3	0	0	5	1	**25**
For Grove	1	1	2	1	1	6	0	0	0	1	**13**
Pioneer	2	5	14	3	9	3	0	1	2	3	**42**
Column Totals	**9**	**9**	**49**	**10**	**46**	**20**	**0**	**2**	**14**	**7**	
									Total		**166**

Number of dead trees by site and tree lot found at the two measurement times in 1995.

The mean change in tree height was negative for all five tree lots and across all five sites. There are several factors which may have contributed to this mean decrease in height:

1. The frost of February 1995 resulted in top damage that confounded the measurement of total tree height. Some terminal buds may have been recorded as healthy at the time of nursery measurements when they were in fact damaged or dead.
2. All sites are covered by a layer of duff and/or slash. As a result, trees were planted deeper then they were in the nursery bed.
3. Trees died back after out-plant, or were browsed by animals.

Figure 2 shows the mean dieback at each site that occurred between the time of out-plant in early March 1995 and the time of bud break in June 1995. Only trees which were recorded as having a healthy terminal bud at the time of nursery measurements (589 seedlings) were included in the estimation. The dieback estimate is the mean for all tree lots at each site.

Figure 3 shows the mean height and growth increment for each of the 5 tree lots. Growth increment is the only appropriate measure by which to make growth comparisons since the trees are now on the average shorter than they were when initially measured at the nursery. We define growth increment as the length of new growth added for a given year, irrespective of total height. It is measured at the point on the main stem at which the tree began growing to the base of terminal bud on the dominant live stem.

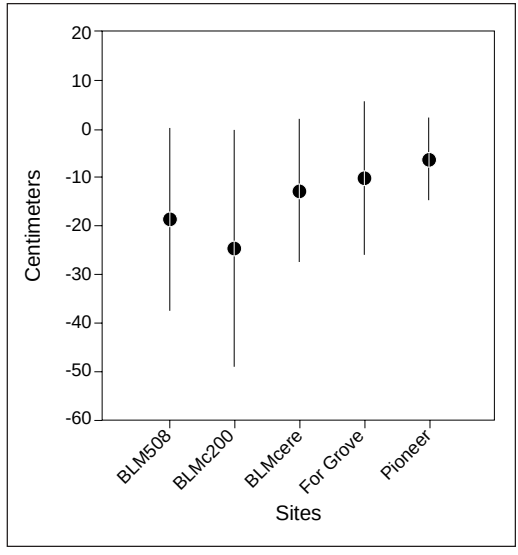

Figure 2. Mean dieback that occurred after out-plant at the five study installation.

Our objective in this study is to identify morphological attributes associated with vigorous, fast growth trees across an environmental gradient. Therefore, statistical comparisons will be based on site and seedlings, not tree lot. A significant difference in mean growth increment was found to exist between some sites. The following table shows the site, the number of

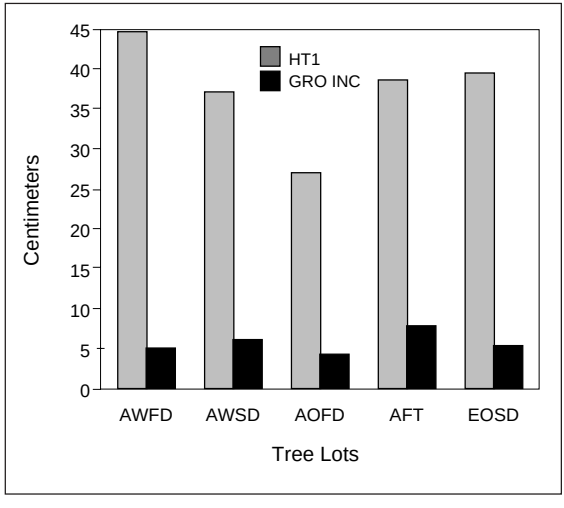

Figure 3. Mean height and growth increment of 1995

live trees at each site (N), the mean growth increment (in centimeters), at each site, and the Ryan_s Q Grouping in which sites with the same letter are not significantly different from one another.

Site	*N*	*Mean*	*Ryan's Q Grouping*	
BLMcere	*278*	*8. 845*	*A*	
BLMc200	*226*	*5.708*		*B*
BLM508	*295*	*4.525*		*B*
			C	
Pioneer	*260*	*4.134*		*B*
			C	
For Grove	*274*	*3.668*	*C*	

Mean growth increment and least significant differences in growth increment for seedling at the five installation sites.

Overall, the maple trees did not growth enough to compensate for the dieback they suffered in the nursery and/or at the site. Yet there was a surprisingly small percentage of trees that actually died.

It is our hope that these trees will grow vigorously in 1996 so that the separation of good and poor performers will be more apparent.

OTHER APPLIED RESEARCH

Other applied research includes projects conducted by or in association with HSC staff and of likely interests to HSC Cooperators, but not funded by the HSC.

HYBRID POPLAR PRODUCTION IN THE WILLAMETTE VALLEY

Although not funded by the HSC, work has resumed on hybrid poplar project which may be of interest to HSC cooperators. Dave Hibbs leads the poplar project at OSU with help from Faculty Research Assistant, Dina Brown, and from Rick Fletcher, the Benton and Linn County Forestry Extension Agent. A very beneficial and productive cooperative effort between James River Corporation, Georgia-Pacific Company, and OSU exists but is not as structured and formalized as the HSC. Funding for the poplar project is provided by the Oregon Department of Agriculture with the primary aim of developing an alternative crop for smoke-restricted ryegrass seed farms. The primary objective at this point for hybrid poplar is pulp production, but other products such as veneer, oriented strand board and particle board are being developed.

The focus of the hybrid poplar project is three-fold: (1) to continue to build a database of growth information from existing cottonwood stands, (2) to determine best site preparation techniques, and (3) to continue to educate and inform the public. Toward these goals, we have measured 47 plots in established cottonwood stands throughout the Willamette Valley (27 of these plots were the same plots measured in the 1994 study.) As we include this new data with the previously collected information, our growth and yield curves become much more robust.

Our previous work (Hybrid Poplar Production for Willamette Valley Ryegrass Sites by Withrow-Robinson and Hibbs) revealed that good poplar growth could be expected on certain Willamette Valley soils, such as Amity silt loams, whereas poor growth was experienced on Dayton silt loams, a very closely related soil to Amity soils. Both Amity and Dayton soils are extensively cropped to ryegrass seed in the Willamette Valley. We have begun a site preparation study to determine if certain cultural practices can improve growth on the poorer yielding soils.

Five pre-plant site preparation treatments have been installed on a Dayton silty clay loam near Tangent, Oregon. The treatments are: (1) simple ripping - use of a heavy, rigid tine to break up compacted layers to a depth of 18"-22"; (2) cultivation - plowing and rolling, combined with ridging - creation of a 10" high planting “hill”; (3) cultivation combined with ripping and ridging; (4) winged sub-soiling - commonly used in breaking up deep (down to 30"), compacted layers at landings following forest harvesting operations; and, (5) no-till - a control with no mechanical site preparation. A sixth treatment, early-summer light cultivation for weed control, will be applied to half of all the original five treatment plots.

The Tangent, Oregon site was planted in mid-March, 1996, and growth and survival will be monitored for the next two growing seasons. Two additional site preparation installations are planned for this fall.

As interest in growing hybrid poplar expands, we get an ever increasing call for informational seminars. We have received requests for poplar information from as far south as the Klamath region, from the coastal areas surrounding Tillamook, and east all the way to the Idaho border. These requests obviously keep us very busy carting our slide projectors around the state!

EDUCATIONAL ACTIVITIES

PRESENTATIONS

Hybrid Poplar Management. Dave Hibbs led presentations to farmers and small woodland owners in Toledo, Albany, Eugene, Corvallis, Roseburg, Klamath Falls and Junction City.

Alder Management. Dave Hibbs presented a program on alder management to woodland owners in Tillamook.

Hardwood Management. Dave Hibbs led tours of hardwood management options for Linn and Polk Counties woodland owners.

Hardwood Pruning. Dave Hibbs presented a program on hardwood pruning to Willamette Valley farmers and woodland owners.

Master Woodland Managers. Dave Hibbs led sessions on hardwoods and silvicultural alternatives for an advanced group of woodland owners in this Extension program in Tillamook and Klamath Falls.

Silviculture Institute. Dave Hibbs presented programs on hardwood management and riparian zone management to participants in this year's SI course.

DIRECTIONS FOR 1996-1997

At the beginning of the Alder Stand Management Study, we set the goal of completing the Type 2 matrix of installations in 1996. We did not make it. A couple of site prep problems, a corporate buy-out, and a lot of frozen seedlings got in the way. After this experience, I am reluctant to predict completion in 1997 but the HSC is going to do all it can to see that we meet this goal.

We will continue to test and refine our trunk and crown form measurement system.

Our first study of bigleaf maple, a study of seedling quality, will be complete. We need to decide what further avenue to pursue.

We have developed a working plan with the OSU/SMC modeling group to work with alder. We will be pursuing external funding for the initial stages of this effort.

A regional study of alder genetics should begin in 1996 with some HSC members participating.

APPENDIX 1. PUBLICATIONS

Hibbs, David, Sam Chan, Mike Castellano, and C. Niu. 1995. Response of red alder seedlings to CO_2 enrichment and water availability. New Phytologist 129:569-577.

Jensen, Ed, Debora Anderson, and David Hibbs. 1995. The reproductive ecology of broad leaved trees and shrubs: red alder. OSU Forest Research Laboratory, Research Contribution 9C.

Knowe, Steve, and David Hibbs. 1996. Stand structure and dynamics of young red alder as affected by planting density. For. Ecol. Mgt. (in press).

Withrow-Robinson, Brad and David Hibbs. 1995. Hybrid poplar production for Willamette Valley ryegrass sites. OSU Forest Research Laboratory, Research Contribution 11.

APPENDIX 2. FINANCIAL SUPPORT RECEIVED IN 1995-1996

Cooperator	Support
B.C. Ministry of Forests	$8,000
Bureau of Land Management	7,500
Coast Mountain Hardwoods, Inc.	4,500
Diamond Wood/Northwest Hardwoods	6,000
Gifford Pinchot National Forest	7,500
Goodyear-Nelson Hardwood Lumber Company	4,500
International Paper Co.	6,500
Oregon Department of Forestry	6,500
Siuslaw National Forest	8,000
USDA Forest Service PNW Research Station[1]	-
Washington Department of Natural Resources	8,000
Weyerhaeuser Company	6,500
Subtotal	$73,500
Forestry Research Laboratory	$56,291
Total	$129,791

[1]In-kind contributions