THE CHANGING HARDWOOD EXPORT MARKET AND RESEARCH TO KEEP THE U.S. COMPETITIVE

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ABSTRACT

Primary hardwood processors face many interrelated market, product, processing, and resource problems generated by the increasing export market. In processing, yields and quality must be increased and costs must be reduced to stay competitive. Computer-aided and computer-controlled automated processing is also needed. The industry needs to keep its products competitive with other materials and with foreign products in an international marketplace. It also must deal with a vast array of resource problems accentuated by too much demand for a few species and too much low-grade material in our forests and at our mills. A research program has been designed to help primary hardwood processors remain competitive.

The USDA Forest Service, Southeastern Forest Experiment Station, is focusing the efforts of its new Blacksburg, Virginia, research project on primary hardwood processing and products. Major thrusts will improve utilization of hardwood resources through increased automation, computer control, and improved processing. Use of findings will help our primary hardwood industry to stay competitive in an increasingly international marketplace. The products research will be aimed at technical problems associated with domestic and foreign markets, product opportunities, and opportunities to more fully utilize existing hardwood resources. Ways will be sought to stretch supplies of currently popular species and grades, and to increase use of abundant but unpopular species and grades.

This paper describes past, present, and projected demands for U.S. hardwoods on the export market. It outlines our resource situation as it relates to the export market. Finally, it lists the hardwood research started or planned at Blacksburg aimed at keeping the primary hardwood products industry competitive both here and overseas.

The hardwood export market has changed dramatically since 1975 (Table 1). World demand for U.S. hardwood logs, lumber, and veneer has quadrupled. Exports to Europe, and particularly the Pacific Rim, have grown significantly. According to some of the latest FAO world forest products data, the United States in 1985 ranked No. 1 in the world in sawn hardwood production, and No. 3 in the world in hardwood lumber exports based on value and quantity of shipments. About $1 of every $5 received by the hardwood sawmill industry is a result of the export market.

Table 1.--Hardwood (log, lumber, and veneer) exports for 1975, 1980, 1986, and 1987, in million board feet

Destinations	1975 exports	1980 exports	1986 exports	1987 exports
Canada	147	202	175	239
Europe	51	256	238	320
Pacific Rim	8	33	203	281
Total	206	491	616	840

Source: U.S. Department of Commerce.

Recent Hardwood Exports

On a dollar basis, Canada was the No. 1 importer of hardwood products (logs, lumber, and veneer) from the United States in 1987 (Table 2), up from the No. 3 position in 1986 (Table 3). West Germany, Japan, and Taiwan followed closely. The order in 1986 was Taiwan, West Germany, Canada, and Japan (Table 3) l The Canadians purchased mainly lumber, while West Germans purchased more veneer and logs than lumber on a value basis. The Japanese and Taiwanese purchased mainly lumber. The other major markets for American hardwoods were, in order of importance, Italy, the United Kingdom, Belgium, South Korea, Spain, the Netherlands, Mexico, and France.

The major species purchased from the United States were red oak, white oak, and a category called "other" (Tables 4 and 5). These three species groups made up 80 percent of log exports, 90 percent of lumber exports, and 90 percent of veneer exports in 1986. In 1987 the numbers changed to 81 percent for log exports and 86 percent of lumber exports. The veneer exports remained the same. The "other" category contains popular species such as black cherry and red alder.

Since 1975 log exports to Europe and Canada have grown slightly, but there have been ups and downs during that period. There was a peak in European demands in 1980, and Canadian demands have started to pick up after decreases in 1985 and 1986 l Pacific Rim demand for logs has grown steadily since 1982.

Table 2. --U.S. hardwood product exports, by country, 1987

Country	Logs		Lumber		Veneer		Total value*
	Quantity (MBF)	Value (M $)	Quantity (MBF)	Value (M $)	Quantity (MSqFt)	Value (M $)	(M $)
Canada	29,610	9,107	202,159	102,333	311,316	15,361	127,947
w. Germany	44,122	36,375	34,261	29,574	474,582	43,918	109,868
Japan	13,578	16,841	123,317	79,304	29,472	1,960	99,807
Taiwan	23,505	17,377	95,271	67,876	110,379	9,728	96,269
Italy	6,064	7,052	37,858	30,587	80,885	6,348	43,986
U. Kingdom	368	540	47,676	34,093	85,474	7,651	42,284
Belg & Lux	2,681	3,310	42,575	32,972	51,373	4,435	40,717
S. Korea	12,977	10,258	11,496	6,984	28,699	3,521	20,763
Spain	979	1,312	15,991	13,294	55,188	4,231	18,819
Netherlands	1,768	2,386	18,566	13,978	2,740	259	16,621
Mexico	1,795	1,181	31,536	13,738	59,357	410	15,331
France	1,981	2,133	10,865	7,514	18,593	1,441	11,091
Other	9,870	10,403	54,231	42,588	130,600	12,671	61,516
Total	149,298	118,275	725,802	474,835	1,384,658	111,934	705,044

Source: U.S. Department of Commerce.
* Total value may not equal the sum of log, lumber, and veneer values per country.

Table 3. --U.S. hardwood product exports, by country, 1986

country	Logs		Lumber		Veneer		Total value
	Quantity (MBF)	Value (M $)	Quantity (MBF)	Value (M $)	Quantity (MSgFt)	Value (M $)	(M $)
Taiwan	18,411	15,062	88,767	66,321	114,166	11,010	92,393
w. Germany	61,862	31,968	25,448	23,492	386,395	32,009	87,469
Canada	21,673	8,279	149,037	70,391	143,199	8,545	87,215
Japan	10,024	13,440	61,162	45,324	20,413	1,108	59,872
U. Kingdom	561	498	29,880	24,229	57,717	5,288	30,015
Belg & Lux	2,470	3,307	27,559	24,057	22,656	1,869	29,233
Italy	3.897	5,044	19,140	16,028	39,225	3,634	24,706
S. Korea	6,013	5,967	5,040	3,113	35,698	3,595	12,675
Spain	1,010	1,566	9,501	8,221	26,734	1,993	11,780
Netherlands	818	1,034	13,315	10,279	1,176	67	11,380
France	1,923	1,686	8,493	6,612	16,940	1,317	9,615
Other	10,221	9,414	60,942	39,071	131,443	11,328	59,813
Total	138,883	97,265	498,284	337,138	995.762	81,763	516,166

Source: U.S Department of Commerce.

Table 4. --U.S. hardwood product exports, by species, 1987

Species	Logs		Lumber		Veneer		Total value*
	Quantity (MBF)	Value (M $)	Quantity (MBF)	Value (M $)	Quantity (MSqFt)	Value (M $)	(M $)
Birch	12,804	3,394	in "Maple"		2,669	169	3,563
Maple	13,719	5,456	46,645	17,103	32,162	2,287	24,846
Red Oak	34,729	21,413	332,968	202,561	296,506	22,402	246,376
White Oak	51,047	44,358	125,642	117,400	560,849	53,041	214,799
Ash/Hickory	in "other"		70,855	35,936	in "other"		35.936
Walnut	6,246	13,175	16,942	11,231	90,688	8,960	33,366
Other	30,753	309479	132,750	90,604	401,784	25,075	146,158
Total	149,298	118,275	725,802	474,835	1,384,658	111,934	705,044

Source: U.S. Department of Commerce.
* Total value may not equal the sum of log, lumber, and veneer values per species.

Table 5. --U.S. hardwood product exports, by species, 1986

Species	Logs		Lumber		Veneer		Total value
	Quantity (MBF)	Value (M $)	Quantity (MBF)	Value (M $)	Quantity (MSqFt)	Value (M $)	(M $)
Birch	3,919	1,334	in "Other"		5,225	311	1,645
Maple	11,091	4,688	25,138	8,789	24,441	1,484	14,961
Red oak	32,614	19,213	247,155	159,928	236,318	16,533	195,674
White oak	65,581	35,861	89,960	79,163	402,960	37,647	152,771
Ash/hickory	in "Other"		28,824	16,005	in "Other"		16,005
Walnut	5,587	12,983	11,001	7,730	72,642	6,300	27,013
Other	20,091	23,186	96,206	65,523	254,176	19,478	108,187
Total	138,883	97,265	498,284	337,138	995,762	81,753	516,256

Source: U.S. Department of Commerce.

Similar amounts of hardwood lumber go to the three major market areas, and all three markets have grown at very positive rates since 1985 creating supply problems for many exporters. Unknown amounts of rough-dimension stock are mixed with lumber in this category. It would be extremely helpful to have information on the extent of our rough-dimension exports.

Hardwood veneer exports to the European market started to increase in 1985 and reached record levels in 1987. Canadian demands for veneer more than doubled from 1986 to 1987. Combined Canadian and Pacific Rim demands for veneer were only about 60 percent of European shipments in 1986 however. Pacific Rim demands for American veneer appear to have leveled off temporarily. Probable causes are former overbuying and/or attempts to find cheaper substitutes.

Canada is the largest single national importer of U.S. hardwoods. Canadian imports of U.S. hardwood lumber topped 200 million board feet (MMBF)in 1987. Canada also has been a steady customer for American hardwood products. However, it does re-export some of our lumber, mostly to Europe. It also exports veneer manufactured from imported U.S. logs. Canada should maintain its position as the No. 1 importer of U.S. hardwoods because Canadians want hardwood products and have limited supplies of fine hardwoods.

Shipments of lumber to Western Europe increased dramatically from 1973 to 1983 but dropped in 1984 and 1985. In 1986, shipments increased to nearly the record levels achieved from 1980-83. In 1987, shipments of hardwood lumber to Western Europe increased to over 200 MMBF and passed the 1980-83 levels. Veneer exports recovered with 2 years of shipment increases in 1986 and 1987 after decreasing in 1984 and 1985. Log exports increased in 1986 and decreased moderately in 1987. Log exports in 1986 and veneer exports in 1987 were near the record levels of 1980. We look for moderate growth in the near future, but economically derived, technological changes are taking place that could lower short- and long-term demands. Inroads into markets traditionally supplied by tropical hardwoods could change this forecast while providing markets for nonselect U.S. hardwood species.

The Pacific Rim market has been growing and now demands the equivalent of 281 MMBF, or 33 percent of total U.S. hardwood log, lumber, and veneer exports. This material is shipped primarily to Japan , Taiwan, and South Korea. The Taiwanese are purchasing mainly red and white oak to process into finished parts and furniture for export. Their largest furniture export market is the United States. According to Taiwanese statistics, 63 percent of its wood furniture exports from 1980 to 1984 were shipped to the United States. Indications suggest continued growth in Taiwanese furniture exports to the United States and elsewhere, so Taiwan's demand for American hardwoods should increase. South Koreans are also importing wood for export furniture products, but on a smaller scale than the Taiwanese.

The Japanese have been buying mainly red alder, black cherry, maple, yellow poplar, red oak, white oak, and cottonwood. More than half of these purchases are dressed or planed, kiln-dried lumber (mostly red alder). In contrast to Taiwan, Japan uses U.S. hardwoods primarily as substitutes for Japanese hardwoods . Future Japanese needs will depend on many internal market factors and will be influenced mainly by Japan's limited domestic hardwood resources and the desire for real wood from temperate hardwood forests.

EASTERN HARDWOOD SAWTIMBER RESOURCES

Generally, the same select hardwood species are popular on both the domestic and export markets and both markets are growing. The most favored species are the select red and white oaks, yellow birch, hard maple, black walnut, black cherry, and the ashes. The rising demands have generated concerns about supplies. Can the United States continue to supply both the domestic and export markets? can U.S. exports increase? Are U.S. resources being depleted? How much secondary-quality material will be produced in the future while generating the needed top-quality, clear or almost clear, high-grade export material?

The answers to these questions are just as important to secondary-product producers in the United States as they are to overseas users. In this section, we look at estimated 1985 sawtimber volumes for the Eastern United States and projections for 1990, 1995, and 2000. Next, we look at the log grade distribution of U.S. commercial sawtimber resources and translate these data into estimates of top, secondary, and lower grade lumber output.

Sawtimber Quantity

Resource data were compiled on all hardwood sawtimber and on the group of species defined previously as select species from USDA Forest Service state resource evaluation reports. For each state, hardwood sawtimber inventory, growth , removals, and quality data were collected for the reported survey year. The data were then adjusted to a 1985 base and combined into the eastern hardwood summary and projections in Table 6.

The eastern results show that 32 percent, or 233 billion board feet (International 1/4-inch rule), of the 1985 estimated sawtimber inventories are in the select sawtimber species. Of that total, 59 percent are select oaks; 18 percent hard maple; 19 percent ashes, walnut, and cherry; and 4 percent yellow birch. The projections show positive inventory growth for the Eastern United States for all categories. By the year 2000, 33 percent of the eastern sawtimber could be in the select species--up slightly from 1985. Further, by the year 2000, the eastern select species sawtimber resources may increase by 42 percent. However, even with this growth, we also could have about 680 billion board feet in nonselect species hardwood sawtimber.

Table 6.--Estimated eastern sawtimber volumes for 1985 with projections for 1990, 1995, and 2000 in billion board feet (International 1/4-inch rule)

Year	All commercial hardwoods	All select hardwoods	Select oaks	Hard maple	Ash, walnut, cherry	Yellow birch
1985	727.9	233.0	136.9	43.4	44.0	8.8
1990	811.5	261.9	149.9	50.8	51.0	9.5
1995	904.9	294.4	164.3	59.5	59.3	10.2
2000	1008.8	330.9	180.1	69.6	68.9	11.1

Sawtimber Quality

Two hardwood grading systems are used to describe the quality of standing hardwood sawtimber in the Eastern United States. The first is a log grading system and the second is a lumber grading system. In general, top grade FAS&Sel (Firsts-and-Seconds and Select) lumber is used for moldings, millwork, export, and other uses requiring clear or almost clear lumber. Secondary-quality lumber, graded 1C (No. 1 Common) and 2C (No. 2 Common), is used primarily for domestic dimension, furniture, cabinet, flooring, and other products that do not require clear lumber. Material below 2C grade is used in railroad ties, mine timbers, pallets, and flooring.

By state, we gathered sawtimber quality information and combined it to generate the eastern data in Table 7. The log-grade information was then transformed into potential output of sawn lumber by lumber grade. We assumed that lumber would be produced from the average distribution of logs in the woods. In actual practice, however, many low-grade logs are never removed from the forests l Consequently, the quality of logs removed from the woods is better than what is found in the winds. The actual distribution of sawn lumber will therefore be higher than the numbers in Table 7.

The eastern results show that 15 percent of the volumes of select species are in log grade 1, and 24 percent are in log grade 2, with the remaining 61 percent in log grades 3 and 4. Potential output of sawn lumber by lumber grade for the Eastern United States is 12 percent in top grade (FAS&Sel), 50 percent in the 1C/2C grades, and 38 percent in the below 2C grades.

Table 7.--Estimated quality of eastern hardwood select species sawtimber, by log grade and potential output of sawn lumber by lumber grade

Species	Log grade			Lumber grade[a]			
	1	2	3&4	FAS&Sel	1C	2C	Below 2C
	----------Percent----------						
All select hardwoods	15	24	61	12	23	27	38
Select oaks	15	24	61	12	24	27	37
Hard maple	12	23	65	11	21	26	42
Ash, walnut, cherry[b]	15	25	60	19	25	29	27
Yellow birch	11	26	63	12	21	24	43

[a] Grade 4 not included, all logs grades 3 and 4 were considered as grade 3 in calculations.

[b] Lumber yields based on cherry yield tables from northern statistics.

The Resource Answers

The Eastern United States has substantial quantities of select species, and these resources are increasing rather than decreasing. By the year 2000, U.S. inventories of the select sawtimber species could increase by 42 percent to 331 billion board feet (International 1/4-inch rule). Thus, it would appear that the United States has the resources necessary to continue to supply domestic markets; to continue as a major player in the world hardwood market, and to increase supplies of secondary hardwood products on both domestic and export markets. However, to alleviate problems from timber sales through primary processing and selling primary products, improved markets for nonselect species are needed here, and abroad. If these markets are not created, we will continue to hear about the mining of select species and that our quality is going downhill.

The quality of our standing sawtimber dictates that 50 percent of hardwood lumber output would be secondary-quality (1C/2C) material and 38 percent even poorer. The vitality of markets for secondary-quality material, therefore, determines the overall economic performance of a sawmill. Development of new uses for secondary-quality material, such as value-added export dimension, need to be constant goals for primary producers. Its importance is equal to those of improving product quality, improving mill productivity, and containing Costs.

SITUATION SUMMARY AND PRESENT AND PROPOSED RESEARCH

Our primary hardwood processing industry is faced with many interrelated market, product, processing, and resource problems. Many of these problems are generated by the increasing export market. Processors must improve yields, improve quality, and reduce costs to stay competitive. They must modernize with computer-aided and computer-controlled processing. They must also deal with a vast array of resource problems accentuated by too much demand for a few species and too much low-grade material in forests and at mills.

Leadership and research are needed to help the industry to remain competitive in the international marketplace. Special help is needed to more fully utilize computers in more automated processes. The U.S. is the No. 1 producer of sawn hardwoods in the world, and we have the resources and the markets to continue. The U.S. position is dominant because of adequate yields, above average quality, and low costs and because we can supply the full range of hardwood products (high grade to low grade products). For the U.S. primary hardwood processing industry to stay competitive in domestic and international markets, improved and new automated primary hardwood processing technologies must be identified, evaluated, and developed.

Some research goals in this problem area are to:

1. Determine the potential benefits of improved hardwood sawmill edging and trimming.

2. Design and demonstrate a computer-aided sawmill edging and trimming system.

3. Determine and develop a complete prototype vision system to identify defects and board outlines to automatically grade rough lumber.

4. Develop a link between log scan data and a sawmill simulator to produce lumber.

5. Develop the link between log scan data and veneer log decisions.

A balance must be maintained between available resources and resource demands. For example, high demand for select oaks in foreign and domestic markets has created tight supplies and very high prices, while many nonselect species are abundant and much less expensive. Sixty-eight percent of our hardwood resource is in nonselect species. Of the total sawtimber resources, 6.4 percent is

yellow-poplar, 6 percent is sweetgum, 5.3 percent is soft maple, and 22 percent is nonselect red and white oaks. Without greater use of these nonselect species, our timber harvesters will be required to continue to mine the preferred species and bypass the nonselect species. This situation is causing many problems for timber owners, loggers, and mill operators. We need to develop opportunities for the economical use of nonselect species. Markets are changing and opportunities have to be monitored. There seem to be potential opportunities in construction and industrial areas for the use of nonselect species. We must be aware of these opportunities, we must determine potential in our research, and we must develop innovative new ways to use nonselect hardwoods. For the U.S. primary hardwood processing industry to remain competitive, new or improved products must be identified, evaluated, and developed that use our abundant nonselect hardwood sawtimber resources.

Some research goals in this problem area are to:

1. Characterize the primary products needed in new and emerging high-value markets.

2. Develop new primary production concepts to maximize value.

3. Determine structural characteristics for sweetgum and yellow-poplar lumber.

4. Improve the efficiency of production of rotary cut hardwood veneer and furniture plywood.

5. Determine the material properties of low-grade hardwoods for use in industrial products.

Major quality problems exist for select as well as nonselect hardwood species. Approximately 60 percent of the saw logs in standing timber are in log grades 3 and 4. If those logs are processed at a sawmill with the other 40 percent in grades 1 and 2, only about 35 percent of the lumber is No. 1 common and better. The rest would be considered low grade that is sold below cost. Different approaches are needed to profitably convert and market products made from low-quality logs for foreign and domestic markets. For profitable use of our low-quality hardwood sawtimber, we must develop and demonstrate systems to make short-length lumber and dimension from short length logs.

Some research goals in this problem area are:

1. Develop grading standards for efficient production of short-length (4- to 8-foot) hardwood lumber for furniture, cabinet, or general use.

2. Develop, describe, and test the grading systems under industry conditions.

3. Describe factory equipment and layouts changes needed to implement such a system.

4. Demonstrate the system for industry acceptance and use.

5. Develop and test a sawmill system to process green rough dimension similar to existing European systems.

In summary, our research and development efforts are aimed at helping primary hardwood processors to maintain their competitive standing through advanced processing systems and through profitable use of low-quality sawtimber and nonselect species. Support for our research problems is well documented in the October 1987 report, "Research Priorities for for Eastern Hardwoods," by the Hardwood Research Council. We are very interested in your thoughts on our current and future research. Please contact me directly or through the Hardwood Research Council.

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Symposium of the Hardwood Research Council.
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