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LUMBER GRADE RECOVERY FROM HAWAII-GROWN  
ROBUSTA EUCALYPTUS LOGS

Roger G. Skolmen

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Lumber has been produced from plantation-grown robusta eucalyptus (*Eucalyptus robusta* Sm.) logs in Hawaii for a number of years. And yet very little of it has been graded by standard, industry-accepted rules. Consequently, little information is available about the lumber grade yield that can be expected from the timber.

Malcolm<sup>1</sup> compiled the only accurate information available. The data in his exploratory study were for 47 logs from 10 trees. Four of the trees were from one stand and six from another—both stands were about 35 years old. His findings are useful only as an indication of trends—not for predicting grade yields.

To obtain the opinions of experienced hardwood specialists on sawing, grading, drying, and manufacturing robusta, we shipped 30 logs to Michigan. The logs were sawed and the lumber graded there. This phase of the study provided grade yield information that supplements Malcolm's data.

Preliminary indications are that yields by log grade compare favorably with those of common hardwoods on the United States mainland. The sample in the study was far too small to provide a basis for predicting grade yields. But it appears that recovery of hardwood lumber grades from graded robusta logs may vary considerably between stands.

#### THE STUDY

The logs used in the study were cut from 12 trees: 5 from a 60-year-old stand at Opana, Maui; 4 from a 45-year-old stand at Mountain View, Hawaii Island; and 3 from a 33-year-old stand at Honomu, Hawaii Island. The logs were graded by using standard U.S. Forest Service Log Grades for eastern hardwoods.<sup>2</sup> The scaled length of the logs was held to a foot shorter than the actual length to allow for serious end splitting—a characteristic usually found in the species.

The logs were sawed for grade lumber insofar as the serious spring in them allowed. That is, due to springing (bending) of the logs as growth stress was

**ABSTRACT:** In part to supplement meager data on lumber grade yield of Hawaii-grown timber, 30 robusta eucalyptus logs were shipped to a Michigan sawmill for processing. The logs were from 12 trees in three different stands. The lumber produced was graded according to National Hardwood Lumber Association standards. The sample was too small to provide a basis for predicting grade yields, but robusta yields, by log grade, compared favorably with yields of common hardwoods on the United States mainland.

**OXFORD:** 176.1 *Eucalyptus robusta* (969):853:854.  
**RETRIEVAL TERMS:** *Eucalyptus robusta*; Hawaii; lumber grading; log grading.

relieved in sawing, occasional shim cuts were made to straighten faces. And often the logs were turned earlier than would be normal for best grade recovery, so as to keep the stress more nearly balanced.

The grade lumber produced was of thicknesses generally in demand by furniture manufacturers—4/4, 5/4, 6/4, and 8/4. The logs were sawed around to

boxed heart 4 by 4's, 4 by 8's, or 8 by 8's from which 4 by 4's to be used as pallet blocks were produced.

The lumber produced was graded and tallied by a qualified hardwood inspector. Standard grades were used without exceptions for peculiarities of the species. Grades marked were FAS, Select, Number 1 Common, and Number 2 Common. The 4 by 4's were

Table 1.—Lumber grade yield by log number

| Log No.       | Diam. small end | Scaled length | Log grade | Log scale <sup>1</sup> | Total lumber tally | Lumber tally by grade |     |     |     |     | Tally in 1C and better |
|---------------|-----------------|---------------|-----------|------------------------|--------------------|-----------------------|-----|-----|-----|-----|------------------------|
|               |                 |               |           |                        |                    | FAS                   | Sel | 1C  | 2C  | 3C  |                        |
|               | <i>Inch</i>     | <i>Feet</i>   |           |                        |                    | <i>Board feet</i>     |     |     |     |     | <i>Percent</i>         |
| OPANA         |                 |               |           |                        |                    |                       |     |     |     |     |                        |
| 1-1           | 17              | 12            | 1         | 150                    | 139                | 26                    | 40  | —   | 9   | 64  | 47                     |
| 1-2           | 15              | 12            | 2         | 115                    | 122                | 51                    | —   | 9   | 16  | 46  | 49                     |
| 1-3           | 13              | 17            | 2         | 125                    | 117                | 23                    | 20  | 10  | —   | 64  | 45                     |
| 2-1           | 21              | 12            | 1         | 235                    | 231                | 32                    | 68  | 16  | 69  | 46  | 50                     |
| 2-2           | 18              | 14            | 1         | 200                    | 203                | 17                    | 83  | 24  | 23  | 56  | 61                     |
| 2-3           | 17              | 16            | 2         | 205                    | 226                | 7                     | 43  | 81  | —   | 95  | 58                     |
| 3-1           | 9               | 16            | 3         | 50                     | 51                 | —                     | —   | 5   | 3   | 43  | 10                     |
| 4-1           | 14              | 16            | 2         | 135                    | 90                 | —                     | 7   | 16  | 11  | 56  | 26                     |
| 5-1           | 17              | 12            | 1         | 150                    | 135                | —                     | 27  | —   | 60  | 48  | 20                     |
| 5-2           | 14              | 16            | 2         | 135                    | 123                | 9                     | 24  | 13  | 13  | 64  | 37                     |
| 5-3           | 13              | 16            | 3         | 115                    | 94                 | —                     | —   | 19  | 27  | 48  | 20                     |
| Total         | —               | —             | —         | 1,615                  | 1,531              | 165                   | 312 | 193 | 231 | 630 | 44                     |
| MOUNTAIN VIEW |                 |               |           |                        |                    |                       |     |     |     |     |                        |
| 11-1          | 22              | 10            | 1         | 215                    | 223                | 54                    | 70  | 40  | 37  | 22  | 74                     |
| 11-2          | 20              | 12            | 1         | 210                    | 222                | 53                    | 49  | 40  | 16  | 64  | 64                     |
| 11-3          | 19              | 12            | 1         | 190                    | 181                | 63                    | 49  | 13  | 26  | 30  | 69                     |
| 11-4          | 17              | 14            | 2         | 180                    | 208                | 7                     | 31  | 83  | —   | 87  | 58                     |
| 12-1          | 22              | 10            | 1         | 215                    | 234                | 88                    | 50  | 52  | 13  | 31  | 81                     |
| 12-2          | 20              | 12            | 1         | 210                    | 258                | 41                    | 100 | 40  | 9   | 68  | 70                     |
| 12-3          | 19              | 12            | 1         | 190                    | 220                | 22                    | 61  | 52  | 50  | 35  | 61                     |
| 12-4          | 18              | 14            | 2         | 200                    | 199                | 7                     | 13  | 111 | 8   | 60  | 66                     |
| 16-1          | 13              | 16            | 2-3       | (2)                    | (2)                | (2)                   | (2) | (2) | (2) | (2) | —                      |
| 17-1          | 14              | 14            | 2         | 115                    | 118                | 30                    | 16  | 3   | —   | 69  | 41                     |
| 17-2          | 13              | 14            | 2-3       | 100                    | 82                 | 14                    | 6   | —   | 24  | 38  | 24                     |
| Total         | —               | —             | —         | 1,710                  | 1,945              | 379                   | 445 | 434 | 183 | 504 | 74                     |
| HONOMU        |                 |               |           |                        |                    |                       |     |     |     |     |                        |
| 13-1          | 15              | 12            | 2         | 115                    | 101                | —                     | 19  | 11  | 7   | 64  | 30                     |
| 13-2          | 13              | 16            | 3         | 115                    | 97                 | 9                     | 11  | 11  | 22  | 44  | 32                     |
| 14-1          | 14              | 12            | 2         | 100                    | 97                 | —                     | 40  | 7   | 26  | 24  | 48                     |
| 14-2          | 13              | 16            | 3         | (3)                    | (3)                | (3)                   | (3) | (3) | (3) | (3) | —                      |
| 14-3          | 12              | 16            | 3         | 95                     | 117                | —                     | —   | 8   | 23  | 86  | 7                      |
| 15-1          | 16              | 10            | 1         | 110                    | 103                | 19                    | 9   | 36  | —   | 39  | 62                     |
| 15-2          | 15              | 16            | 2         | 160                    | 149                | 19                    | 20  | 30  | —   | 80  | 46                     |
| 15-3          | 14              | 16            | 3         | 135                    | 95                 | —                     | 14  | 15  | 19  | 47  | 31                     |
| Total         | —               | —             | —         | 715                    | 624                | 42                    | 76  | 92  | 70  | 344 | 34                     |
| Total         | —               | —             | —         | 4,270                  | 4,235              | 591                   | 870 | 745 | 511 | 518 | 52                     |

<sup>1</sup>International 1/4-inch log rule.

<sup>2</sup>Inadvertently combined with log 14-2, so omitted.

<sup>3</sup>Inadvertently combined with log 16-1, so omitted.

assumed to be Number 3A and 3B Common and tallied as Number 3 Common. Grade recovery was recorded for each log.

### RESULTS

The best yield was obtained from Mountain View logs, which were also the largest and highest in log grades (*table 1*). Logs of comparable size and grade from Opana, Maui, had a lower grade yield, despite having come from older trees. The logs from Honomu, from young trees, had the poorest yield. These differences may be due to the small sample size, rather than to differences between stands.

Yield by log grade varied considerably between stands. The grade 1 logs from Opana, for example, produced much less 1 Common and Better than the grade 1 logs from Mountain View (*table 2*).

Table 2.—Yield of No. 1 common and better lumber, by log grade

| Source                    | No. logs | Log grade |    |    |             |
|---------------------------|----------|-----------|----|----|-------------|
|                           |          | 1         | 2  | 3  | Below grade |
|                           |          | Percent   |    |    |             |
| Opana                     | 11       | 48        | 45 | 17 | —           |
| Mt. View                  | 11       | 70        | 57 | 24 | —           |
| Honomu                    | 8        | 62        | 42 | 22 | —           |
| 1959 study <sup>1</sup>   | 47       | 69        | 54 | 30 | 37          |
| Weighted average          | —        | 62        | 50 | 27 | —           |
| Over-all weighted average |          |           |    | 46 |             |

<sup>1</sup>Logs from two locations — Mountain View and Hutchinson Sugar Co. Log scale, originally Scribner, converted to International 1/4-inch to compare with present study.

The yield by log grade compares generally with the yield of important mainland species (*table 3*). The Mountain View logs produced yields, by log grade, similar to yellow poplar, the best of the mainland species.

The most serious grading defect in robusta lumber proved to be tiny pin knots caused by epicormic buds. Similar defects are common to many tropical

Table 3.—Yield of No. 1 common and better lumber, by log grade<sup>1</sup>

| Species                     | 1       | 2  | 3  |
|-----------------------------|---------|----|----|
|                             | Percent |    |    |
| Birch, yellow               | 70      | 43 | 13 |
| Maple, hard                 | 68      | 41 | 15 |
| Oak, red (upland)           | 72      | 45 | 18 |
| Poplar, yellow              | 73      | 47 | 20 |
| Beech                       | 67      | 47 | 19 |
| Hickory                     | 65      | 40 | 14 |
| Unweighted average          | 69      | 44 | 17 |
| Over-all unweighted average |         | 43 |    |

<sup>1</sup>Source: U.S. Forest Prod. Lab. Hardwood log grades for standard lumber, proposals and results. Rep. 1737, Tbl. 1, pg. 6, 1959.

hardwoods: "Philippine mahogany" usually has them. In these other species, pin knots are usually ignored. And it is reasonable to expect that they could be ignored in grading robusta as well—if and when robusta becomes established in the marketplace. If pin knots were not classed as a defect, lumber grade yield from robusta logs would be much higher than reported here.

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### NOTES

<sup>1</sup>Malcolm, F. B. *Quality evaluation of Hawaiian timber*. U.S. Forest Prod. Lab. Rep. 2226, 28 p., illus. 1961.

<sup>2</sup>U.S. Forest Serv. Northeastern Forest Exp. Sta. *A guide to hardwood log grading*. 50 p., illus. 1963.

### The Author

ROGER G. SKOLMEN is on the staff of the Station's Institute of Pacific Islands Forestry, with headquarters in Honolulu, Hawaii, where he has been investigating the uses, properties, and processing of forest products. Native of San Francisco, he holds B.S. (1958) and M.S. (1959) degrees in forestry from the University of California, Berkeley.



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