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## PRUNING AND SHEARING THE KNOBCONE X MONTEREY PINE HYBRID FOR CHRISTMAS TREES

Robert E. Rappleye, Sr. and J. C. Borden<sup>1/</sup>

**Abstract:** Results of a study in pruning and shearing the knobcone X Monterey pine hybrid at Spring Gulch (fig. 1) in Trinity County indicates that the best time for pruning and shearing is August in current growth and September in year old growth.



Fig. 1. Spring Gulch Plantation where a study was made.

<sup>1/</sup> Forest Advisor, California Division of Forestry, Redding, California; and Trinity County Farm Advisor, Weaverville, California.

### Introduction

The first known artificially produced pine hybrid was developed by crossing the knobcone (Pinus attenuata) and Monterey (Pinus radiata) pines. This was done at the Institute of Forest Genetics, Placerville, El Dorado County more than four decades ago. In 1929 the first seedlings from the cross were outplanted at the Institute.

Numerous crossings of the two species have been made subsequently, and seeds from these have been sent to many countries for test plantings. Test plantings of the progeny also have been made extensively throughout California.

The accepted scientific name of the hybrid is Pinus attenuradiata<sup>2/</sup>. As a hybrid it exhibits the characteristics of the Monterey's rapid growth, and the cold and drought resistance of knobcone<sup>3/</sup>.

In the spring of 1964 several plantings of the hybrid were made by Bureau of Land Management in the French Gulch, Lewiston, Douglas City and Platina areas of Trinity County<sup>4/</sup>. The plantings were a joint project of the Pacific Southwest Forest and Range Experiment Station and Bureau of Land Management. The purpose of the project was to test the adaptability of knobcone X Monterey pine hybrid to low elevation and low quality forest sites in Northwestern California. The project leader was James R. Griffin, Pacific Southwest Forest and Range Experiment Station.

Because of interest in the potential of this hybrid for Christmas trees, and the apparent need for shearing and pruning to produce quality trees (fig. 2, fig. 3) arrangements were made by the authors with the Experiment Station and Bureau of Land Management, to develop an experimental pruning and shearing plot in a plantation at Spring Gulch near Douglas City. Pruning and shearing were started in March 1967 on hybrids labeled R-5. The R-5 cross was produced by pollinating selected native knobcone pines on the El Dorado National Forest, California, with Monterey pine pollen from trees at the Institute of Forest Genetics.

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- 2/ Little, Elbert L. 1953. Check list of native and naturalized trees of the U.S. (including Alaska). U.S.D.A. For. Serv. Agr. Handbook No. 41. 472 pp.
  - 3/ Little, Elbert L. Jr. and Francis I. Richter, 1965. Botanical descriptions of forty artificial pine hybrids. U.S.D.A. Tech. Bul. No. 1345. 47 pp.
  - 4/ Griffin, James R. January 10, 1966. Adaptability of knobcone X Monterey pine hybrids to lower elevation, lower quality forest sites in northwestern California. (2nd Progress Report)

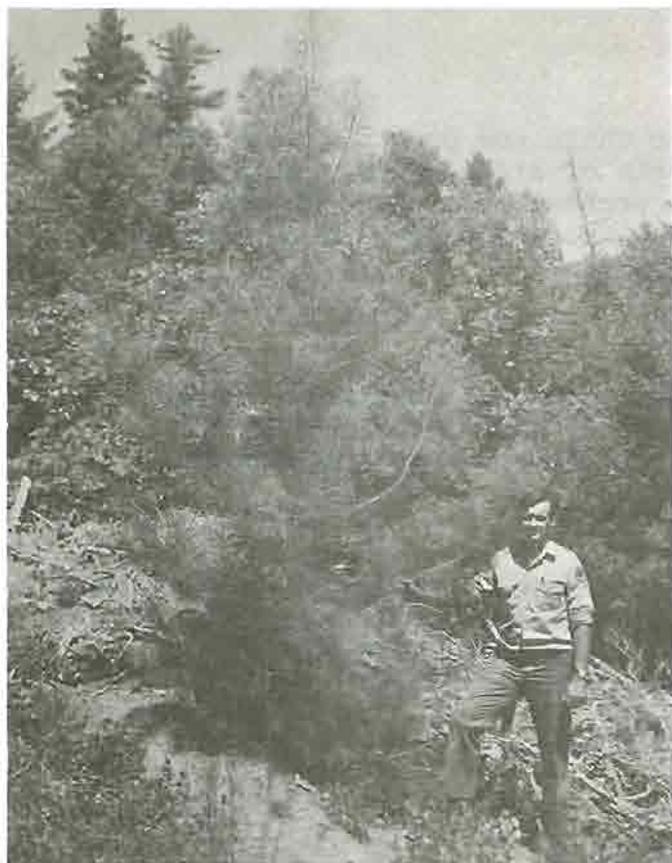


Fig. 2. A tree which has not been pruned or sheared.



Fig. 3. A pruned and sheared tree.



Fig. 4. A suppressed top whorl.

Pruning and shearing pines must be done while new growth is succulent and new needles are about half the length of old needles. Pruning and shearing done too early results in profuse bud sets; if done too late, bud sets may be scarce or lacking. Monterey pine is an exception. It can be pruned and sheared at any time<sup>5/</sup>.

### Objectives

The project was established to determine; (1) if the hybrid can be pruned and sheared at any time like Monterey pine or only when the new growth is succulent, and (2) best time for pruning and shearing.

### Plan

The plan called for pruning and shearing 5 trees in current year's growth and five trees in one year old wood each time the project area was visited. Pruning and shearing were started in March 1967 and done monthly, thereafter, up to and including December 1967.

Pruning and shearing standards were as follows:

1. Prune leaders to 12 inches.
2. Prune laterals in top whorl 6 inches.
3. Shear the remaining portion of the tree to a 60-70 percent taper.

Pruning and shearing were not started in current growth until June when the leader growth exceeded 12 inches.

The project plan was followed except in one instance when extremely bad weather caused the April pruning and shearing to be done so late in the month that there would have been no advantage in a May operation. This should not affect the results because the current year's growth just barely exceeded 12 inches at the time of the June pruning and shearing. Also, pruning and shearing in year old wood in March and April should give a good indication of response of trees treated in old wood prior to June.

### Results

Numbers of buds produced after pruning and shearing were used to evaluate results. Table 1 summarizes numbers of buds obtained on the leader and laterals of the top whorl based on month of treatment, and age of growth at time of pruning and shearing. The figures entered

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<sup>5/</sup> Blanford, Robert. 1962. Plantation Christmas trees for southern California. State of California, Dept. of Cons., Div. of Forestry. 25 pp. Mimeograph.

Table 1. Number of trees by pruning date that set indicated number of buds, and average and maximum number of buds set.

CURRENT YEAR

|       | Leader         |   |   |   |   |           |      |      | Top Whorl               |   |   |           |      |      |
|-------|----------------|---|---|---|---|-----------|------|------|-------------------------|---|---|-----------|------|------|
|       | Number of Buds |   |   |   |   |           |      |      | Number of Buds/Branches |   |   |           |      |      |
|       | 0              | 1 | 2 | 3 | 4 | 5 or more | Avg. | Max. | 0                       | 1 | 2 | 3 or more | Avg. | Max. |
| March | -              | - | - | - | - | -         | -    | -    | -                       | - | - | -         | -    | -    |
| April | -              | - | - | - | - | -         | -    | -    | -                       | - | - | -         | -    | -    |
| June  | -              | - | - | 1 | - | 4         | 6    | 9    | -                       | 2 | 3 | -         | 2    | 3    |
| July  | -              | - | - | - | - | 5         | 6    | 8    | -                       | 1 | 3 | 1         | 2    | 4    |
| Aug.  | -              | - | - | - | - | 5         | 14   | 20   | -                       | 1 | 1 | 3         | 3    | 4    |
| Sept. | -              | - | - | - | - | 5         | 10   | 10   | 1                       | - | 2 | 2         | 3    | 4    |
| Oct.  | -              | - | - | - | - | 5         | 9    | 10   | 1                       | 2 | 1 | 1         | 2    | 3    |
| Nov.  | -              | - | - | - | - | 5         | 9    | 10   | 2                       | - | 3 | -         | 1    | 3    |
| Dec.  | -              | - | - | - | - | 5         | 9    | 10   | 5                       | - | - | -         | 0    | 0    |

YEAR OLD GROWTH

|       | Leader         |   |   |   |   |           |      |      | Top Whorl               |   |   |           |      |      |
|-------|----------------|---|---|---|---|-----------|------|------|-------------------------|---|---|-----------|------|------|
|       | Number of Buds |   |   |   |   |           |      |      | Number of Buds/Branches |   |   |           |      |      |
|       | 0              | 1 | 2 | 3 | 4 | 5 or more | Avg. | Max. | 0                       | 1 | 2 | 3 or more | Avg. | Max. |
| March | -              | - | - | - | - | 5         | 21   | 30   | -                       | 3 | - | 2         | 2    | 8    |
| April | -              | - | - | - | - | 5         | 10   | 16   | -                       | 2 | 1 | 2         | 2    | 3    |
| June  | -              | - | - | - | 1 | 4         | 8    | 12   | 3                       | - | 1 | 1         | 1    | 4    |
| July  | -              | 1 | - | 1 | - | 3         | 5    | 8    | 2                       | 1 | - | 2         | 2    | 4    |
| Aug.  | -              | - | 1 | - | - | 4         | 11   | 19   | 2                       | 2 | - | 1         | 2    | 6    |
| Sept. | -              | - | - | - | - | 5         | 14   | 30   | -                       | - | 1 | 4         | 5    | 8    |
| Oct.  | -              | - | - | - | 1 | 4         | 8    | 10   | 3                       | 1 | - | 1         | 1    | 5    |
| Nov.  | 2              | - | - | - | - | 3         | 6    | 10   | 2                       | - | 1 | 2         | 3    | 9    |
| Dec.  | -              | - | - | - | - | 5         | 11   | 13   | 1                       | - | 1 | 3         | 3    | 6    |

in the table represent the number of trees that have 0, 1, 2, 3, 4, or 5 or more buds per pruned leader and the number of trees that have 0, 1, 2, or 3 or more buds per pruned or sheared lateral branch in the top whorl. Establishment of an upper limit of 5 or more buds on the leader and 3 or more buds on branches of the top whorl was to insure a minimum of buds to provide for a leader and four branches in the first whorl of the pruned leader, and a terminal and two laterals for each pruned lateral. The table also shows the average and maximum number of buds set.

Data for this table were based on information collected in August 1967 for trees treated in March and April 1967, November 1967 for trees treated in June, July and August 1967, and May and August 1968 for trees treated in September, October, November and December 1967.

Table 2 converts data in Table 1 from the number of trees reaching the various levels of bud development to the percent of treated trees reaching or exceeding these various levels.

During the final assessment of the results of pruning and shearing at Spring Gulch on September 23, 1969, the following observation was made. The pruned or sheared top whorl of some trees had become suppressed (fig. 4) with the future potential Christmas tree developing above this whorl. Table 3 summarizes the extent of this suppression.

#### Conclusions

Based on the results of this project, it appears that the following conclusions can be drawn regarding pruning and shearing the R-5 knobcone X Monterey pine hybrid in Trinity County.

1. Leader pruning in July, August, September, October, November or December in current growth, or March, April, September or December in year old growth results in a minimum of 5 buds per pruned leader.
2. Pruning and shearing of first whorl laterals does not result in good bud development. This should be researched further.
3. The best time for pruning and shearing appears to be August in current growth and September in year old growth.

Although knobcone X Monterey pine hybrid seedlings are presently available only for experimental plantings, propagation techniques are being developed that promise larger quantities for growers in the future. Studies such as this one on pruning and shearing will aid growers in knowing how to more efficiently manage hybrids and newly selected species for Christmas trees as they become available.

Table 2. Percent of trees that set indicated number of buds.

|       | CURRENT GROWTH |           |           |                         |           |           |           |
|-------|----------------|-----------|-----------|-------------------------|-----------|-----------|-----------|
|       | Leader         |           |           | Top Whorl               |           |           |           |
|       | Number of Buds |           |           | Number of Buds/Branches |           |           |           |
|       | 3 or more      | 4 or more | 5 or more | 0 or more               | 1 or more | 2 or more | 3 or more |
| March | -              | -         | -         | -                       | -         | -         | -         |
| April | -              | -         | -         | -                       | -         | -         | -         |
| June  | 100            | 80        | 80        | -                       | 100       | 60        | 0         |
| July  | -              | -         | 100       | -                       | 100       | 80        | 20        |
| Aug.  | -              | -         | 100       | -                       | 100       | 80        | 60        |
| Sept. | -              | -         | 100       | 100                     | 80        | 80        | 40        |
| Oct.  | -              | -         | 100       | 100                     | 80        | 40        | 20        |
| Nov.  | -              | -         | 100       | 100                     | 60        | 60        | 0         |
| Dec.  | -              | -         | 100       | 100                     | 0         | -         | -         |

|       | YEAR OLD GROWTH |           |           |           |           |           |                         |           |           |           |
|-------|-----------------|-----------|-----------|-----------|-----------|-----------|-------------------------|-----------|-----------|-----------|
|       | Leader          |           |           |           |           |           | Top Whorl               |           |           |           |
|       | Number of Buds  |           |           |           |           |           | Number of Buds/Branches |           |           |           |
|       | 0 or more       | 1 or more | 2 or more | 3 or more | 4 or more | 5 or more | 0 or more               | 1 or more | 2 or more | 3 or more |
| March | -               | -         | -         | -         | -         | 100       | -                       | 100       | 40        | 40        |
| April | -               | -         | -         | -         | -         | 100       | -                       | 100       | 60        | 40        |
| June  | -               | -         | -         | -         | 100       | 80        | 100                     | 40        | 40        | 20        |
| July  | -               | 100       | 80        | 80        | 60        | 60        | 100                     | 60        | 40        | 40        |
| Aug.  | -               | -         | 100       | 80        | 80        | 80        | 100                     | 60        | 20        | 20        |
| Sept. | -               | -         | -         | -         | -         | 100       | -                       | -         | 100       | 80        |
| Oct.  | -               | -         | -         | -         | 100       | 80        | 100                     | 40        | 20        | 20        |
| Nov.  | 100             | 60        | 60        | 60        | 60        | 60        | 100                     | 60        | 60        | 40        |
| Dec.  | -               | -         | -         | -         | -         | 100       | 100                     | 80        | 80        | 60        |

Table 3. Percent of trees with suppressed pruned or sheared top whorls.

| Month of pruning | Current growth | Year old growth |
|------------------|----------------|-----------------|
| March            | -              | 100%            |
| April            | -              | 60%             |
| June             | 40%            | 80%             |
| July             | -              | -               |
| August           | -              | 20%             |
| September        | -              | -               |
| October          | -              | 60%             |
| November         | 20%            | 80%             |
| December         | -              | 20%             |