



PERFORMANCE OF 15 and 13 YEAR OLD HYBRID PINES AT TWO SITES
ON MOUNTAIN HOME DEMONSTRATION STATE FOREST

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Figure 1.

Forester measures rapid growth
of six year old planted pine.

Several pine hybrids have shown promise as potential species for outplanting in the Sierra Nevada mountains. Early testing has shown that selected hybrids have the potential of equaling or exceeding the growth of native species. They may also offer some resistance to damage caused by animals, insects, and snow (Libby, 1958) (Stark, 1964) (Critchfield and Krugman, 1967). Field tests of two hybrid pine species were established in 1966 and 1968 on Mountain Home Demonstration State Forest, Tulare County, to determine their performance on two selected sites. The hybrids to be tested were Pinus jeffreyi x (jeffreyi x coulteri) and Pinus ponderosa x ponderosa var. arizonica. In addition to the hybrids, wind pollinated Pinus ponderosa and Pinus jeffreyi were planted for comparison purposes.

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Trial #1

In 1966 two hybrid combinations along with wind pollinated ponderosa pine seedlings were planted on a mechanically cleared site at the 5600 foot elevation. The soil is of the Chawanakee and Shaver series, granitic parent material, Dunning's site Class I. Annual precipitation averages 35-40 inches in the form of rain and snow. Snow depths range to 6 feet and over. Annual temperatures range from a minimum of 0°F to a maximum of 95°F. The plantation aspect is northerly. The seedlings were planted in randomized rows of ten trees each on an 8'x8' spacing. The planted species were:

1. Jeffrey pine x (jeffrey x coulter pine), P. jeffreyi x (jeffreyi x coulteri), seed parent Butte #2 (Scott John Creek), pollen parent Jeffrey x Coulter, San Diego County, designated JXJC.
2. Ponderosa pine x Arizona pine, P. ponderosa x ponderosa var. arizonica, seed parent Calaveras #6 (West Point), pollen parent Apache pine, Eddy Arboretum, designated PXAP.
3. Ponderosa pine, P. ponderosa, seed parent Calaveras #6 (West Point) wind pollinated, designatd P-CAL.
4. Ponderosa pine, P. ponderosa, seed parent El Dorado #6 (Badger Hill) wind pollinated, designated P-ED.

Survival, height, and diameter measurements were made periodically through 1976 and are summarized in Table #1.

TABLE 1. Survival and average height of planted pines in Trial #1.

Species or Hybrid	<u>1970</u>	<u>1970 Height</u>		<u>1973 Height</u>		<u>1976 Height</u>	
	Survival	Average	Range	Average	Range	Average	Range
	Percent	-----Feet-----					
JXJC	95	5.0	(1.9-7.8)	9.5	(3.6-13.7)	13.8	(6.3-18.7)
PXAP	73	3.7	(1.5-7.4)	6.5	(2.3- 9.2)	9.9	(4.5-18.0)
P-CAL	78	3.7	(1.5-6.8)	6.6	(2.1-12.9)	9.8	(3.4-18.0)
P-ED	78	3.1	(0.6-5.6)	5.9	(2.2-10.9)	9.0	(3.5-17.5)

The average height of the JXJC hybrid is significantly greater at the 95% confidence level for all years measured. The height differences between the PXAP, P-CAL, and P-ED are not significantly different at the 95% confidence level.

The plantation was precommercially thinned at age 14 years in 1979. Leave trees were selected on the basis of height, diameter, tree spacing, and damage from snow or insects. Of the 228 trees existing in 1976, 143 were removed leaving 85 desirable crop trees. Tree spacing after thinning averaged 14'x14'. Average height and diameter by species measured in 1980 following thinning is shown in Table #2.

TABLE 2. Diameter and height of 15-year old planted pine leave trees one year after thinning in Trial #1.

Species or Hybrid	1980 DBH		1980 Height	
	Average	Range	Average	Range
	----- (inches) -----		----- (feet) -----	
JXJC	6.0	(3.2-9.3)	24.7	(12.3-33.1)
PXAP	4.0	(2.1-7.9)	17.6	(11.1-28.1)
P-CAL	4.4	(1.8-7.8)	20.0	(9.5-35.7)
P-ED	3.3	(0.9-6.0)	15.3	(5.8-25.6)

Trial #2

This test involved the planting of Jeffrey x (Jeffrey x Coulter) hybrids along with Jeffrey pine controls on a cleared site at the 6400 foot elevation. Soil is of the Shaver series, granitic parent material, Dunning's site Class II. Annual precipitation averages 38-45 inches, mostly in the form of snow. Snow depths can range up to 8 feet or deeper. Aspect of the planting site is southerly. Trees were planted during the Spring of 1968. The wind pollinated Jeffrey pine controls along with the seed parent of the JXJC hybrid were both from an El Dorado County (Strawberry) seed source. Pollen parent for the JXJC hybrid was a naturally occurring JXC hybrid of an unknown seed source. Measurements taken in 1971 and 1980 are summarized in Table #3.

TABLE 3. Survival and average height for planted pines in Trial #2.

Species or Hybrid	1971	1971 Height		1980 Height	
	Survival	Average	Range	Average	Range
	Percent	-----Feet-----			
JXJC	43	1.6	(0.1-3.2)	11.9	(2.3-22.2)
JP-Controls	53	1.2	(0.2-2.4)	9.4	(2.8-13.7)

The average height of the JXJC hybrid was significantly greater than the JP-controls for both years at the 95% confidence level.

CONCLUSIONS

In both trials the JXJC hybrid significantly outperformed the other planted pines. It must be noted that the wind pollinated pines used in the two trials were not from a local seed source. It can be noted however that the JXJC hybrid exhibits similar average height and diameters as ponderosa pine plantations studied on similar sites in Northern California (Oliver and Powers, 1978). Selected JXJC crop trees in Trial #1 showed an average height growth of 1.65 feet per year for the first 15 years. The JXJC hybrids were very resistant to snow damage and deer browse and did not sustain significant damage from insects or other animals. This hybrid shows promise as an additional component to the mixed conifer stands in the Sierra Nevada.

The PXAP hybrid showed poor performance on the site in Trial #1. Although growth was similar to the two wind pollinated ponderosa pines planted on the site, it is felt that this hybrid would not compare in growth to pines from a local seed source. The trees suffered from excessive snow damage and have been damaged by insects in other trials (Stark, 1964). It is not recommended that this hybrid be planted on sites similar to that in Trial #1. The tree may have potential at lower elevations or on drier sites.

LITERATURE CITED

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