BADGER HILL BREEDING ORCHARD
ELDORADO NATIONAL FOREST

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One of the first steps in starting the California Region's tree improvement program was the establishment of the Badger Hill Breeding Orchard. Established in 1959 primarily for the production of two special use hybrids, a number of additional projects are now centered at this developmental site.

The major activities include:

1. Knobcone pine breeding orchard
2. Jeffrey pine breeding orchard
I. Jeffrey x Coulter breeding orchard
4. Archive planting of rust-resistant sugar pine grafts
5. First Regional Douglas-fir seed orchard
6. First Regional ponderosa pine seed orchard

Aside from the major activities a number of developmental studies are in progress on the care and management of seed producing orchards. This site also serves as a workshop for grafting studies including the development of field grafting techniques for the several tree species involved,

KNOBCONE PINE BREEDING ORCHARD

Personnel from the Institute of Forest Genetics in 1957 collected knobcone pine seed from 51 geographic sources (provenances) in California and Oregon. The seed was sown in the Institutes' 1958 nursery and the seedlings from 27 different provenances showing the most frost resistance were out-planted as 1.-0 stock at Badger Hill in the spring of 1959. Each source is represented by 50 trees,

This orchard will provide the Region's need for knobcone x Monterey hybrids for any provenance in California. A few conelets were produced on some trees in 1961, and in 1962 all production of this hybrid was shifted to the Badger Hill. breeding orchard. The ability of this hybrid to establish itself readily and grow rapidly on poor shallow soils in areas of low rainfall is most promising. This hybrid is planted at low elevations in pure stands on erosion control. projects and recreation areas,

The 1963 pollination season produced 1093 pollination bags, 2211 cones with over 84 M sound seed. All of the flowers were riot pollinated.

In 1965, Knobcone x Monterey 1-0 seedlings were distributed:

San Bernardino National Forest	1,000
Sierra National Forest	500
Stanislaus National Forest	500
Shasta-Trinity National Forest	750
Bureau of Land Management	5,000

JEFFREY PINE BREEDING ORCHARD

Jeffrey pine seedlings representing the seven seed zones where Jeffrey pine is planted were outplanted in the spring of 1959, with some additional plantings in 1960 and 1961.

The fact that not all Jeffrey pines will produce hybrids necessitates that this be a grafted breeding orchard. Scions from known hybrid producers, selected from our program of screening Jeffrey pine seed parents, will be field grafted to the Jeffrey pine stock.

The grafting program has already begun and will be continued as rapidly as proven hybrid producers are found.

This orchard will provide the California Region's needs for the Jeffrey x (Jeffrey x Coulter) backcross hybrid when the trees start cone production. The J x (JxC) backcross has shown acceptable field resistance to attack by the pine reproduction weevil. In addition, it will resist the western, mountain and Jeffrey pine beetles. This hybrid should be interplanted in all Jeffrey and ponderosa pine sites where the reproduction weevil is known to be present,

Ponderosa pine seedlings were inadvertently interplanted with the Jeffrey pine seedlings in the seed orchard. Jeffrey pine grafts were made on Jeffrey and ponderosa pine seedlings with successful unions on both species.

118 grafts were made in 1962, 1963 and 1964 with an overall success of 40%.

There were a few cones in 1965, more in 1966 and conelets for 1967. The pollen source is unknown.

Several of the 9 year old ponderosa seedlings are bearing cones for 1966 and conelets for 1967. One of them is a mutation that has over 12 conelets at a node.

RUST RESISTANT SUGAR PINE GRAFTS

In the program for developing rust-resistant planting stock, Badger Hill was selected as one of two Regional outplanting sites. Each rust-resistant candidate has been multiplied through grafting and is represented by five grafts at each of the outplanting sites. Badger Hill serves as an archive plot to insure against loss of germ plasm and if certain progenies appear resistant, they will be the nucleous of a small seed orchard. Most of the grafts are pot grafts and the first of these were planted in March 1960. Some field grafting of sugar pine has also been done here.

A few of the sugar pine have cones for 1966 and conelets for 1967. Pollen for cross breeding is now being taken from here instead of the original trees.

DOUGLAS-FIR SEED ORCHARD

The root stock for the Region's first seed orchard was planted here in March 1960. This will be a grafted seed orchard representing selected

superior trees from the Douglas-fir region, primarily the Klamath and Six Rivers National Forests. This orchard will supply improved seed for reforestation at elevations from 1,000 to 3,000 feet.

Experimental field grafting was begun in 1963 and continued in 1964. It is planned to complete the grafting job in 1967 and 1968.

To date 514 grafts have been made with 75% successful unions. Most grafts are cleft grafts with dormant scion wood.

In 1966, the following has been the sequence:

1.	Grafted	3/21 to 4/14
2.	Bands removed and plastic bags opened	6/17
3.	Removed plastic bags	6/30
4.	Opened paper bags	7/5
5.	Removed paper bags	7/15

PONDEROSA PINE SEED ORCHARD

Local root stock for this orchard was planted in March 1962. Grafting was started in 1965 with plans to complete in 1968.

Selected superior ponderosa pine, from 25 year progeny studies, at the Institute of Forest Genetics, will furnish some of the scion material for this orchard.

161 grafts were made in 1965 and 1966 using dormant scion wood. Successful unions are 41%.

In 1966, 42 grafts were made using succulent scions. Successful unions are 74% to date. This is a trial to test succulent scions as a grafting technique.

Other studies

Ponderosa pine

Grafts were made in 1965 of mistletoe resistant trees. These grafts will be inoculated with dwarf mistletoe to test resistance to dwarf mistletoe.

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