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## ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

## Grafting Ponderosa Pine Scions on the Parent Root System

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Describes grafting pine scions on parent rootstock. Reproductive success is much higher than by direct rooting, and is better distributed over the parent population.

**Keywords:** Grafting, *Pinus ponderosa*.

For many purposes, it is advantageous to grow scions of desirable parent trees on root stock of the same genotype. Usually this is accomplished by rooting scions directly, but most species of pine are difficult to root (Hare 1970, Isikawa 1968, McDonald and Hoff 1969, Mirov 1944, Watanabe et al. 1968). By age 11 years, rooting ability of ponderosa pine has declined to about 7 percent, and this ability is concentrated in 10 to 15 percent of the tree population (Tinus, unpubl.).

This Note describes a grafting technique which has the advantages of scion rooting without the incompatibility problems associated with ordinary grafting (Copes 1967). After several years of experiments, the following procedure has been found most effective.

In the spring when the ground has thawed, but buds are still dormant, the litter and surface soil around the base of the tree to be reproduced are shoveled away without digging into the root zone. The surface root system is then exposed by digging with a screwdriver and the hands (fig. 1). The roots should be protected from direct sun and drying by digging under the shade of a tarp. Next, scions are cut from the crown of the tree and veneer-grafted into the side of roots



Figure 1.—Surface root system is exposed by digging with a screwdriver and the hands.

of the same diameter as the scion. The roots remain attached to the mother tree (fig. 2). The union is wrapped with a grafting rubber, sealed with grafting wax or tree sealing compound, and the scion enclosed in a clear polyethylene bag. The bag has been found necessary to reduce transpiration stress until the graft union forms.

To prevent overheating in the plastic bags, the grafts are covered with a conical "tent" of brown kraft paper, burlap, or shade cloth, sup-

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ported by lath (fig. 3) and tied to the bole of the tree at the top. The lower edge is buried. The top of the paper covering is left open on the north side for ventilation. Plenty of air space must be left between the paper cover and the scions.



Figure 2.—Dormant scions are veneer-grafted onto matching roots of the same tree.

Figure 3.—Grafts are bagged with polyethylene. The conical lath structure is covered with a brown kraft paper sunshade.



By midsummer the successfully grafted scions will begin to flush. When flushing begins, the plastic bags are removed and the graftlings cut from the parent tree. As much root below the

graft as practical should be included — usually 25 to 40 cm. The cut ends are dusted with fungicide and then either potted and placed in a sweatbox, or placed in a propagating bench under intermittent mist. Because most of the fine roots are lost when the rootstock is excavated, the graftlings must be treated as if they were unrooted scions. Three months is usually sufficient for reestablishment of a new fine root system.

In 5 years of trials, 386 grafts were made on 24 trees 8 to 13 years of age. Graft union occurred on 247 (64 percent), and 89 graftlings became established trees (23 percent). This is about three times better than can be expected if scions from 8- to 13-year-old trees are rooted directly. Furthermore, grafting and rooting success were well distributed over the parent population, whereas, ability to root scions directly was concentrated in a small proportion of the genotypes (Tinus, unpubl.).

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