

GRAFTING PINE OUT OF DOORS

By

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In the course of our initial approaches to the many problems connected with the development of a well rounded forest genetic and tree breeding program satisfactory methods for the vegetative propagation of conifer clones were needed. The results of investigation in this matter as here presented are largely the result of work within the white or five-needled group of pines, although less extensive work with the hard pines indicates that essentially the same techniques are equally good with that group.

Practical procedures for the asexual propagation of conifers should encompass the requirements of (1) small scale experimental grafting where space, equipment and time allotted to the care of the experimental material are not limiting factors, and (2) the production, on a scale theoretically unlimited, of desired clonal material in a manner least demanding of expensive equipment and labor.

The first of the above requirements is largely met by the conventional, time honoured procedures of bench and case grafting under greenhouse conditions and to a more limited extent (in the pine and other Abietineae) by the rooting of cuttings.

For a considerable time European investigators have been employing techniques of grafting pines and other conifers out of doors which under their conditions produce satisfactory percentages of survival. Attempts to employ their methods under our strongly continental climatic conditions have so far not been encouraging.

Efforts to circumvent some of the difficulties encountered with out of door grafting have been made in recent years through various modifications in timing and technique employed so as to better meet the exacting requirements of our climate. Only the most successful procedure late spring soft wood grafting, will be reported upon here.

This late spring method of grafting involved the use of the new spring growth of both stock and scion. For stocks 2-1 transplants of white pine, *Pinus strobus*, growing in nursery beds were used. The scions were obtained from other five-needled pines, four species and two hybrids.

In making the graft the new growth of the stock was severed about 3/4" above its base and split longitudinally about 1/3". A scion consisting of the new candle with leaves still sheathed is cut about 1 1/2" long, wedge shaped at the base. This scion is inserted in the stock plant already prepared as in an ordinary cleft graft and tied with a grafting rubber band. To prevent drying out of the scion a polyethylene bag of suitable size is tied over the top of the plant in such a way as to include the new whorl of branches being produced below the graft.

Over this bag a heavy water resistant kraft paper bag is added to give shade and prevent excessive heating. The bags were left for one month before being removed and after another two weeks survival counts were made.

Originally it was planned to make something over a hundred of then grafts but the work was interrupted before half completed. Nevertheless the results were so good this year, confirming the exploratory grafting experience of two previous seasons, that the method seems to warrant more extensive trial. Of the clones tested three showed 100% survival, one 72.7%, one 50% and one 0.0% (see table I). Overall survival was 76.1%. At the time of the present writing (January, 1953) all grafts recorded alive in July are still vigorous and healthy.

In addition to the block of grafts reported above a few others were made involving slight variations of the same technique. Scions grafted on the branches of mature trees in the same manner as described survived about equally well indicating a real possibility of top working suitable trees for seed orchard purposes. Also very young plants, can be worked onto an older frame in this manner to further studies in physiology of flower initiation.

The most striking results of all, however, arose by chance as the result of interruption in the work program. Three scions of a hybrid pine (*Pinus parviflora* x *strobilus*) were left without bagging after grafts upon the white pine stocks in the nursery bed. No further attention was paid to them until the survival of the bagged grafts was recorded in July. At that time it was noted that the unbagged scions had wilted as expected and actually died back for a distance of about 2/3 their length. In spite of this the basal 1/3 of the scion had persisted and become established. The latent buds in the needle bundles had become active and were beginning to elongate at this time. A follow up of all three of these plants throughout the rest of the season showed a most striking difference between the subsequent behavior of these unbagged grafts and the bagged ones. Those that had been bagged all made an expected somewhat shortened growth in the scion as the result of the shock of grafting. By July they had completed their growth and developed terminal buds. The unbagged plants, on the other hand, continued to grow actively well into August and reestablished an entirely new well branched top before becoming inactive. The results of this "oversight" in grafting program are so encouraging that a repetition on a considerable scale is planned for the coming spring.

(Illustrated with Kodachromes)

Table I

Five-needled pine species grafts on
Pinus strobus May 27, 1952, Bussey
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Date examined - July 16, 1952

Graft Number	Pinus brachyptera	Pinus parviflora x strobus	Pinus cembra	Pinus ayacahuite	Pinus pumila	Pinus holfordiana x parviflora
1	-	X	-	X	X	X
2	-	X	-	X	X	X
3	-	X	-	-	X	X
4			-	X	X	X
5			X	X	X	X
6			X	X	X	X
7			X	X	X	X
8			X	-	X	X
9				X	X	
10				X		
11				-		

X Successful graft
- Grafting failure