Bud-grafting Yellow-poplar

by

DAVID T. FUNK

Central States Forest Experiment Station
U.S. Forest Service
Athens, Ohio

Several years ago we began work on the vegetative propagation of yellow-poplar (Liriodendron tulipifera L.) with the aim of eventually establishing a clonal seed orchard. We tried field grafting, field budding, and air layering. We then attempted rooting cuttings in the greenhouse and in an indoor propagation bench. The best we could do with any of these methods was 4 percent success; this was with field budding. We suspected that success with field budding would have been greater except for a summer drought, so we turned to nursery budding. With the help of several generous cooperators, especially the Ohio Division of Forestry, we established a series of budding trials at the Marietta State Nursery, where the stock could be watered and otherwise tended.

Assisted by Oswald Pouly of the Ohio Agticultural Experiment Station, we began last year by budding 1,031 trees that had been transplanted into a nursery bed as 1-year-old seedlings. The buds were collected from six scion trees no more than 2 days before budding on 26 and 27 July; they were kept in cold storage until needed. We used the T-budding method and placed all buds at the base of the stock tree.

About 20 percent of the bud grafts were successful when I checked them on 2 April of this year. At that time I cut back the tops of the stock trees to just above the bud. Although only about 8 percent of the total actually sprouted from the scion bud and grew, this was twice as good as we had ever done before so I continued this summer with another trial.

We considered several variables this year (1962): six different budding dates, four different scion trees, budding under a lath house versus in the open, cutting back the tops of stock trees soon after budding versus leaving them until next spring, and mounding over the newly inserted bud with earth versus no mounding. Mounded trees were "unmounded" 10 days later when grafting bands were cut.

Our biggest treatment differences were related to date of budding. When I checked the results on 27 September 1962 budding success was distributed as follows:

Date budded	Percent successful
15 June	12
2 July	12
17 July	66
3 August	82
27 August	69
18 September	100

The trees from which we collected the scion wood had completed their height growth by 2 July, but both buds and branchlets were still entirely green on 17 July. The branchlets began to turn brown in early August. The stock trees in the nursery were watered regularly and continued height growth until about mid-September. These percentages of successful grafts, however, are questionable to the extent that the date of measurement is related to the results; that is, the buds grafted earlier have had more time in which to die than those used in late August and September. Nevertheless, most failures take place within 25 days.

As for differences among scion trees, I believe some trees produce buds that can be grafted more successfully than do others, but the differences are not great. Since we were unable to include all trees on all dates, the actual percentages are not strictly comparable.

The percentage of "takes" was higher in the lath house than out in the open nursery bed by a ratio of 62 to 54. This difference hardly justifies building the house, but I would use one if available.

We were able to try mounding earth over the new buds only for the first and last budding dates. Mounding in these cases did not affect bud takes.

Early removal of stock tops after budding did not influence the percentage of successful unions formed, but this practice does stimulate early bud growth. When we budded in mid-July and cut the tops off 10 days later, 50 percent of the new buds began to grow before mid-August. In contrast, only 10 percent of the buds on stocks with the top not cut off commenced growth. Some nurserymen have advised us that summer growth is not desirable, but we noticed that the few 1961 buds that began to grow the same summer developed into the biggest and best stock during 1962. These early sprouters came through the winter without damage and we had no trouble in the spring with sprouts from the root collar of the stock trees. I believe that this technique can produce bud-grafted stock ready for field planting the first spring after budding.

We tried to find out whether budding high or low on the stock tree was important but could not draw any certain conclusions. High budding has at least one advantage: the bark is thinner than at the base of the stock tree, making it easier to insert the bud. But on high-budded trees, both buds and the tender tops of the stock trees suffer more from wind damage. Low budding on new sprouts combined the advantages of wind resistance and thin bark. More than half the trees that we cut back this spring did not initiate growth from the new bud, but instead sprouted from the root collar. Budding at the base of these new sprouts has been almost 85 percent successful.

CONCLUSION

I admit that these are early results. The budded stock has to live through the winter in the nursery, survive transplanting in the spring, and, of course, flower and fruit some day, if we are ever to have a seed orchard. Nonetheless, I do believe that we are safely over the first hurdle, that of vegetatively propagating our selections.

On the basis of these early results, here are some tentative recommendations for budding yellow-poplar:

1. Schedule budding between 3 and 6 weeks after height growth ends in the woods.

2. If stock plants happen to have basal sprouts (either because of damage or deliberate cutting back), graft buds at the base of these new sprouts.

3. Cut the tops off stock trees just above the bud about 10 days after budding.