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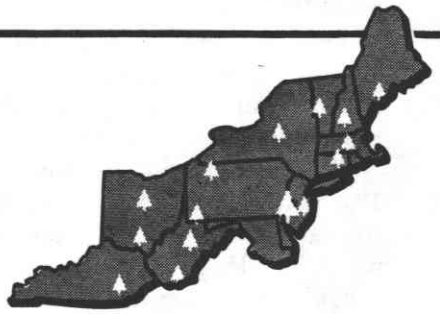


FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE, 370 REED ROAD, BROOMALL, PA. 19008

EFFECTS OF DISBUDDING ON SHOOT MORTALITY AND STEM DEFORMITY IN BLACK CHERRY

—CHARLES O. REXRODE
Principal Entomologist
USDA Forest Service,
Northeastern Forest Experiment Station,
Delaware, Ohio

Abstract.—Insect damage was simulated by the removal of buds from black cherry trees to determine the effects on stem mortality and tree form. Black cherry was very sensitive to disbudding. All degrees of disbudding caused terminal deformities and stem deformity nearly always occurred after the terminal bud was destroyed. Shoot mortality usually occurred after half or more of the buds on the terminal branch were removed. The types of deformities are illustrated.

Keywords: *Prunus serotina,* disbudding, mortality, deformity

Insects destroy the buds on black cherry, *Prunus serotina* Ehrh., in early spring. Destruction of the buds by insects is suspected of causing dead or deformed terminals and reduction in shoot growth. However, there are few reliable data to support this suspicion, because the variability of insect feeding makes such observations and measurements difficult. Therefore, various levels of insect damage were simulated by several levels of bud removal from black cherry trees and the effects recorded.

METHODS AND MATERIALS

Insect damage was simulated by the removal of some to all of the buds from a series of branches on 5- to 10-foot-tall trees, and from the entire tree on 3- to 5-foot-tall trees near Bartow, West Virginia on April 7, 1976.

Four uniform branches in the lower third of the crown were marked on each of eight black cherry trees 5 to 10 feet tall. Four intensities of disbudding, replicated eight times, were randomly assigned to the branches. Each tree received one set of four treatments—one treatment for each branch.

The treatments were:

Removal of all terminal buds.
Removal of all terminal buds and half of the lateral buds on the terminal shoots.
Removal of all buds.
No buds removed (control).

Forty small (3- to 5-feet tall) black cherry trees were also marked. All buds were re-

moved from 30 trees and no buds removed from 10 trees.

The buds were about three times winter size and turgid when removed. They were readily snapped off at the base by a thumbnail with no damage to the twigs.

The tree branches were cut March 16, 1977, 12 months after treatment, and brought to the laboratory for examination and measurement. The length and diameter of the terminal shoots were measured and the number of viable buds on the 1976 growth was recorded. The number of dead and living branches on each tree was also recorded and the form of each tree and branch classified. Examples of the resulting damage are illustrated.

RESULTS AND DISCUSSION

Black cherry is very sensitive to disbudding. Although disbudding did not kill the trees, each level of disbudding caused terminal deformities (Tables 1 and 2). Stems almost always became deformed after the terminal bud was destroyed.

Descriptive data on the mortality of the terminal shoots and recovery of the terminal function are shown in Tables 1 and 2. It was easy to determine whether axillary or adventitious buds developed shoots that assumed the terminal function after disbudding. Generally, terminals developed from shoots arising from axillary buds, even after the complete disbudding treatment. However, terminal function was often assumed by shoots developing lower than the apex of the original terminal (Fig. 2). Although decisions about terminal function were subjective, the inevitable result of disbudding was a deformed tree or branch (Figs. 1, 2, and 3). A normal branch is shown for comparison (Fig. 4).

The effects of disbudding on shoot growth and diameter growth and the production of buds were so variable that it was impossible to detect any significant differences between

Table 1.—Dieback of terminal shoots, recovery of terminal function and stem deformity of black cherry branches after disbudding.

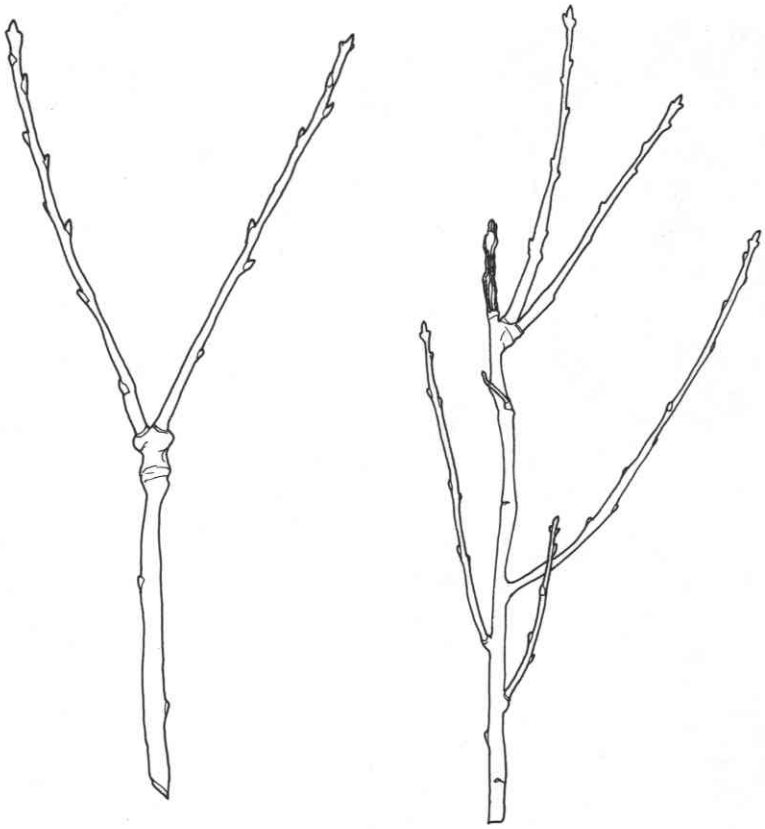
Treatment	Number of branches treated	Percentage of 1975 terminals with dieback	Assumption of terminal function by axillary buds	Percentage of leaders damaged, by type			
				Forked	Multiple	Straight with crook	Normal
Terminal bud	8	12	8 of 8	63	13	12	12
Terminal and half of laterals	8	75	8 of 8	63	25	12	—
Terminal and all laterals	8	100	8 of 8	12	25	63	—
None	8	12	8 of 8	—	—	13	87

Table 2.—Death of terminal shoots, recovery of terminal function and stem deformity of 3- to 5-foot black cherry trees after disbudding.

Treatment	Number of trees treated	Percentage of 1975 terminals dead	Assumption of terminal function by axillary buds	Percentage of leaders damaged, by type			
				Forked	Multiple	Straight with crook	Normal
All buds removed	30	90	30 of 30	17	57	26	—
None	10	80[a]	10 of 10	40	30	10	20

[a]Killed by a freeze on May 8, 1976.

Figure 1.—Forked leaders—typical of damage when terminal bud or terminal bud and half of lateral buds are destroyed.



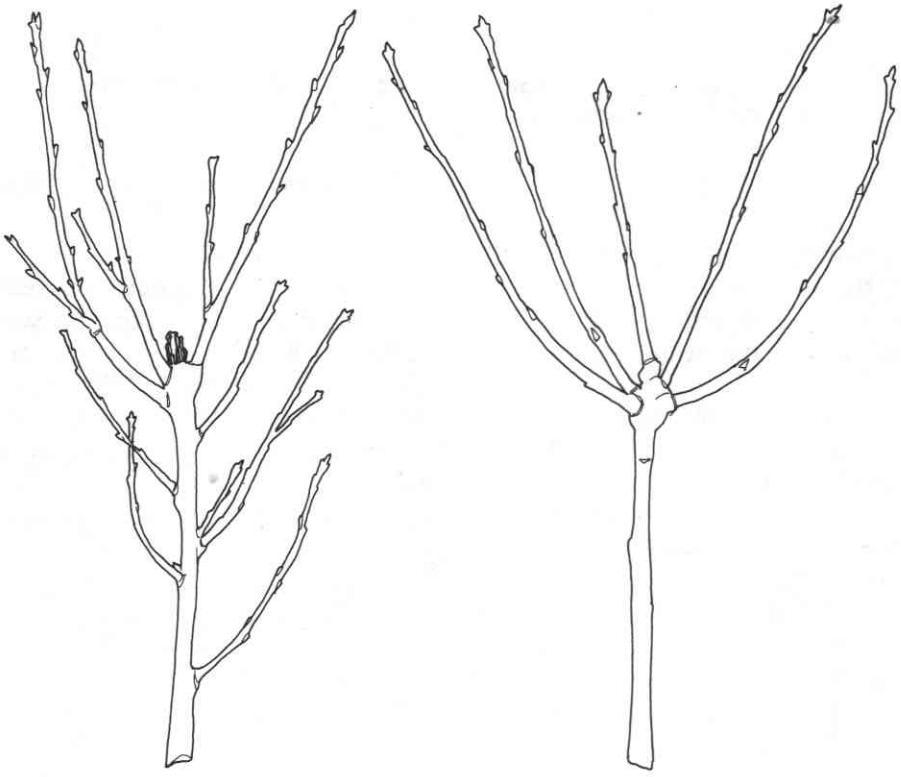


Figure 2.—Multiple leaders—typical of damage when all buds are destroyed or terminal killed by frost.

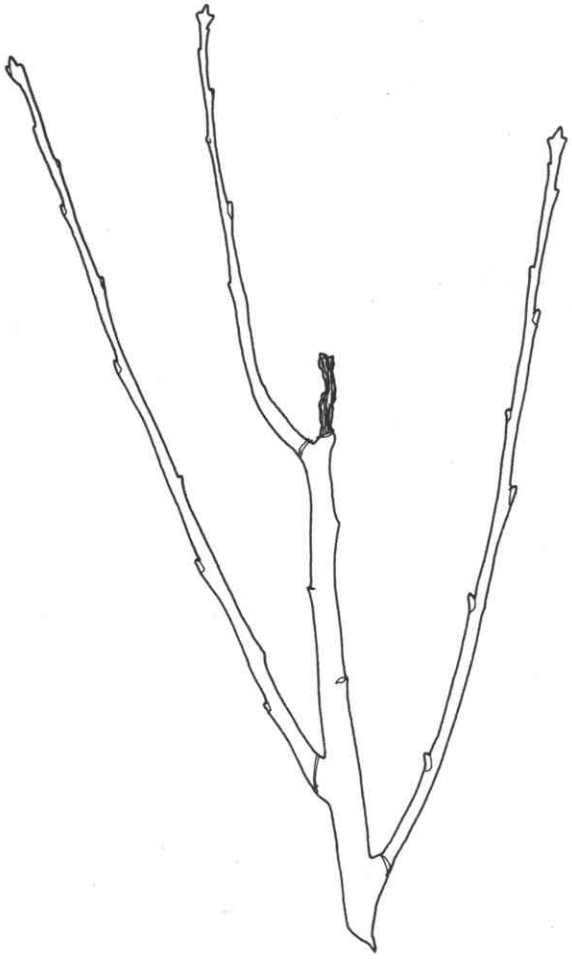


Figure 3.—Single leader with crook—common when all buds are destroyed or terminal killed.

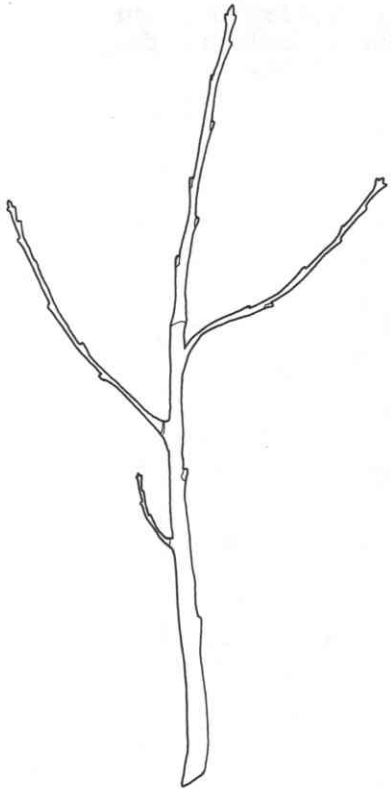


Figure 4.—Normal leader—no damage.

treatments. However, when all of the buds were removed, the effect was almost always a one-year loss of height growth—the 1975 growth died after the buds were removed in April 1976.

There have been many disbudding experiments with hardwood trees for the study of auxins and growth impact (Kulman 1971), but practically no studies of the effects of disbudding on tree quality, especially with black cherry. Since management of black cherry has intensified with emphasis on better quality through the selection and breeding of better stock, insect-caused deformities on young trees have become a serious problem.

Results of this study give us some insight into how bud destruction affects the form of young black cherry trees. The next question to be answered is, "How long do such deformities persist or affect the quality of the trees?"

LITERATURE CITED

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