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Terminal Bud Damage by casebearer moths and late spring frost On Black Walnut

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BLACK WALNUT (*Juglans nigra* L.) growing in Michigan often develops widely forked and multiple tops (Figure 1). This happens when injury or death of the terminal bud causes the loss of apical dominance (a single terminal shoot), and several "terminal" shoots develop. Casebearer moths (*Acrobasis* spp.) and late spring frosts are common causes of this terminal bud injury. This type of damage is especially critical during the "form" phase of black walnut growth. The first 9 to 16 feet of the *bole* of the tree should be free of forks and crooks if black walnut timber, especially high-quality veneer is desired. Also terminal bud damage slows growth, increasing the number of years required to grow a harvestable tree.

Casebearer Moth Injury

Caterpillars (larvae) of two species, *Acrobasis juglandis* and *Acrobasis demotella*, feed on black walnut trees throughout the spring and summer. The feeding habits and the type of silk and frass (insect excrement) case they construct will vary, depending upon the stage of the caterpillar's development. Descriptions of feeding habits and appearance at different times of the year follow:



Fig. 1—Black walnut sapling with poor form resulting from repeated terminal bud damage.

Early spring—In late April and early May, small (1/8" long), brown larvae feed on the base or inside of opening buds. Insect silk and frass may be present on the bud or coming out of the inside (Figure 2). Buds may be partly or entirely damaged.

Early summer—In June, when shoots are partly developed, *A. juglandis* larvae move to the leaves and construct a tube-like case between two leaflets (Figure 3). They leave this shelter to feed on adjacent leaflets. In contrast, *A. demotella* larvae feed down



Fig. 2—Silk and frass on an expanding black walnut bud from a casebearer moth larva.

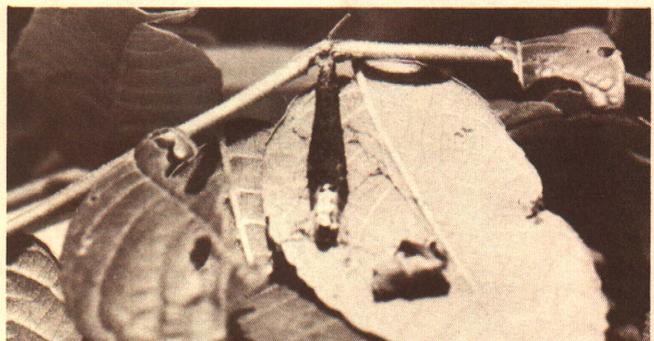


Fig. 3—Feeding shelter and pupal case of *Acrobasis juglandis*.



Fig. 4—Black walnut shoot split open to show *Acrobasis demotella* larva feeding.

the middle of shoots, resulting in the death of that shoot (Figure 4).

Late summer—By August or September a new generation of casebearers is present on the undersides of the leaflets. The larvae feed on the lower surface of the leaves protected by brown, serpentine cases (Figure 5). This feeding appears to cause only slight defoliation.

Winter—Casebearer larvae move to the buds just before leaf fall and construct overwintering cases or hibernacula (Figure 6). They emerge again in the spring to feed on the buds.

Late Spring Frost Injury

Symptoms of frost injury are similar to casebearer injury in that the expanding bud wilts and turns dark



Fig. 5—Feeding case of early instar casebearer moth larva on walnut leaflet.



Fig. 6—Hibernacula of casebearer moth larva near lateral bud.

brown. If **only** the below-freezing temperatures have caused the damage, no insect remains or frass will be present. Frost damage is usually more uniform from tree to tree throughout a plantation or stand than insect injury, although it is usually more severe in localized low areas and valleys, or so-called "frost-pockets". Late spring frost and *Acrobasis* moths may both injure the same bud, making it impossible to name a single causal agent. Late spring frost is likely to be a perennial problem, since black walnut in Michigan is at the northern edge of its range.

Control

Since late spring frosts can cause as much or more terminal bud damage as casebearer moths, insecticides do not always afford satisfactory protection from damage. For this reason, pruning can "correct" the damage (forking) after it occurs.

Corrective Pruning

Two to three weeks after buds burst, assess the damage—casual observation of the buds and shoots should be sufficient. If you see evidence of damage by casebearer moths or late spring frost, plan on doing corrective pruning in early June. Seasonal timing is important for two reasons. First, any damage from the current season has been concluded, and new shoots have grown enough to facilitate choosing one out of the several developing shoots. Secondly, it is still early enough for pruning wounds to be nearly closed over by the end of the growing season.

Proceed as Follows:

1. For each tree with a damaged terminal bud, select the strongest new developing shoot to be the new terminal. In case there are one or more

equally-sized shoots, choose the one closest to the tip of the branch (Figure 7).

2. Using a sharp knife or pair of shears, remove one or more shoots below the one you choose which appear to be "competing" with it. Cut off only the current year's growth. Prune as close as possible to level with the side of the main stem without damaging the bark (Figure 8).

This corrective pruning technique aims to re-establish apical dominance by one shoot to correct forks which may have resulted from terminal bud injury, thus improving tree form.



Fig. 7—Shoot A should be selected for the new terminal. Shoot B and C should be removed.

Corrective Pruning Management

Ideally, corrective pruning should start when the trees are 3 to 4 years old and continue every year as needed until at least 9 feet of straight stem is produced. Also, during the form phase of growth, clear stem pruning should be done to maximize the amount of knot-free wood produced. This is usually begun later, when the trees are 3 to 6 inches d.b.h. (diameter at breast height) and should continue until trees are 8 to 10 inches d.b.h. or until branches are removed far enough up the tree to produce a clear log of the desired length. No less than half the tree height should be in live crown. This type of pruning is best done late in the dormant season. Sprouts sometimes form around pruning wounds, requiring follow up pruning during the growing season.

If corrective pruning has not been done on trees older than 3 or 4 years and terminal bud damage has already occurred for several years, more than just the current year's growth will have to be pruned to train the tree into good form. Don't remove more than about 25% of the live crown area at one time, or growth will be slowed. If a tree is badly misshapen and less than 10 feet tall, consider coppicing. This method of regeneration relies on vegetative reproduction or sprouting. Before growth begins in the spring, poorly formed trees are cut off at ground level. Two to three weeks after several fast-growing shoots appear, all but the largest, most vigorous one should be removed. It is not unusual for a shoot produced this way to grow 5 feet or more the first year.



Fig. 8—Black walnut branch which has been correctively pruned earlier the same year.

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