

Pruning And Tree Thinning

John P. Slusher
Extension Forester, University of Missouri
Columbia, Missouri

THE IMPORTANCE OF SITE QUALITY

Black walnut is very sensitive to soil conditions, developing best on deep, well-drained, nearly neutral soils, which are generally moist and fertile. The better growing conditions are typically located on the lower north and east facing slopes, stream terraces and floodplains. The quality of a site is reflected in its site index rating. Site index is the number assigned which reflects how tall a tree will grow in a certain number of years (usually 50 years). A walnut site index of 80 indicates that location will grow a walnut tree to 80 feet of height in 50 years. Good walnut growing sites produce more useable volume per acre than poor growing sites even where the same number of trees are involved. And, the good sites do it in a shorter period of time.

Brinkman (1966) provides yield data in board-feet-per-acre from various sites (Table 1). The table reveals that walnut on a site index 40 would take 65 years to produce 870 board feet of wood where a site index 80 site could produce it in 25 years.

Table 1. Yields in board feet per acre of black walnut plantations in the north central region by age and site index.* (Trees planted at a 10-foot spacing.)

SITE INDEX

AGE (Years)	40	50	60	70	80
20	--	--	--	--	100
25	--	--	110	380	900
30	--	--	360	1,000	2,200
35	--	200	810	1,930	3,760
40	--	400	1,400	3,300	5,670
45	170	780	2,160	5,100	7,860
50	250	1,200	3,100	6,500	9,820
55	400	1,700	4,150	8,010	11,750
60	630	2,250	5,210	9,380	13,150
65	870	2,800	6,230	10,060	14,400
70	1,060	3,350	7,170	11,620	15,460
75	1,250	3,800	8,000	12,550	18,250

* Volume in board feet per acre (Scribner Rule) of trees 10 inches d.b.h. and larger to an 8-inch top diameter inside bark.

THE IMPORTANCE OF LIGHT

Another characteristic of black walnut which a landowner should know is that it is intolerant of shade. In mixed forest stands it must be in a dominant or co-dominant position with other trees to maintain itself. The intolerance to shade of black walnut is an important factor to consider in several stages of management. If a woodland owner is trying to replant openings created in a natural stand he must be aware that without an opening of at least 1/3 to 1/2 acre in size a walnut planting will almost always result in failure. Even then, several years of controlling competing vegetation is necessary.

Any trees which are overtopped by less desirable trees in the woodland must be released from shading before they become deformed or are stunted to the point they are unable to respond properly to release.

PROPER TREE SPACING

An important concept for the landowner to understand is that of proper spacing of trees within a woodland. It is not practical to try to grow every tree to maturity so the best trees (crop trees) should be selected at appropriate spacings and managed to improve their form and growth. When a choice is possible, dominant and codominant trees should be favored over intermediate or overtopped trees. Select the fastest growing trees as crop trees where quality form is acceptable. External characteristics such as bark pattern often give a good clue to rate of growth. The reddish-brown inner bark will be visible in the bark fissures on fast-growing walnut trees. Slow-growing walnut trees tend to have flat, platy bark.

Trees that are low forked, have excessively large low branches, or are defective for any other reasons should not be selected as potential crop trees although occasionally these trees may have superior nut production qualities that will warrant their retention. Few woods trees produce large nut crops however, because they do not have well developed tops.

Selected crop trees should have adequate growing space in order to maintain rapid growth. Competing trees may be harvested for products, or simply girdled or injected with appropriate herbicides. All vines should be removed from crop trees because they can stunt, kill or deform desirable trees.

There are many rules of thumb or formulas used to determine proper tree spacing. One rule of thumb commonly used is "the distance between two trees should be average of their inches in diameter at breast height (d.b.h.) changed to feet plus a conversion factor of 8 feet." Example: Trees 4 inches d.b.h. and 8 inches d.b.h. would have an average d.b.h. of $(4+8)/2$ or 6 inches. Six inches would be changed to 6 feet plus the conversion factor or 8 feet would then give a spacing of 14 feet between trees.

Another rule provides that enough trees should be removed each time a thinning is made to allow the trees to grow about 4 inches in diameter before the tops become too crowded. On most sites this will mean that tree tops should be about 10 feet apart after each thinning.

Stocking levels and spacings recommended by Phares (1973), based on studies by Krajicek, for high-quality veneer logs and good nut production on good sites are shown in Table 2.

It should be noted (Table 2), that if a major emphasis is placed on nut production, additional trees must be removed to further maximize tree crown development. However, open grown trees tend to retain their lower branches indefinitely. Trees that are drastically released from competition may develop epicormic branches (sprouts from dormant buds along the trunk, commonly called water sprouts). These sprouts must also be removed before they also become limbs which will downgrade the log.

Table 2. Tentative stocking guidelines for growing high-quality black walnut on good sites.

			Recommended stocking and spacing after thinning or releasing for different product objectives*			
Stocking and spacing when crowns begin to touch+			Veneer logs		Veneer logs and nuts	
Average stand d.b.h. (inches)	Trees per acre (number)	Spacing between trees (feet)	Trees per acre (number)	Spacing between trees (feet)	Trees per acre (number)	Spacing between trees (feet)
2	797	7	265	13	225	14
4	380	11	175	16	150	17
6	223	14	125	19	105	20
8	147	17	90	22	80	23
10	104	20	70	25	60	27
12	78	24	55	28	50	30
14	60	27	45	31	40	33
16	48	30	40	33	35	35
18	39	33	35	35	30	38
20	32	37	30	38	25	42
22	27	40	--	--	--	--
24	23	43	--	--	--	--

+ Obtained by using the following equation (Krajicek 1996): crown width in feet = 1.993 d.b.h. in inches + 4.873.

*These values are based on the assumption that crop trees will grow 4 inches in diameter before they again need to be thinned or released.

Many studies indicate that sawtimber-size trees do not respond as well to release and thinning as smaller sized trees so when possible these practices should begin early in the life of the woodland.

CLEAR-STEM PRUNING

A cultural practice which can greatly increase the future value of young walnut trees is clear-stem pruning. By the time a tree has reached 8 to 12 inches in diameter it is often too late for effective pruning because there will not be enough clear wood produced over the pruning wounds to greatly increase log value. Limbs should be removed before they reach 2 inches in diameter to keep the

wound being too large for proper healing. A neat, clean cut should be made, preferably with a pruning saw.

Pruning for clear log length can be started when the trees are about 10 to 12 feet tall (Schlesinger and Funk 1977). Wider spacings in open stands will need pruning at an earlier age than more crowded stands. It is recommended that no more than a third of the live crown be removed at any one time. All pruning should be restricted to the lower half of the tree's trunk. Pruning too many branches from the main crown of small trees can slow growth or cause top heaviness with wind breakage resulting.

How high to eventually prune depends on the product objective and on the cost and difficulty of pruning. I would recommend a minimum of 9 to 10 feet of clear butt log to meet minimum veneer requirements. When nut production is a goal, a fairly large crown is needed and therefore the butt log may be the only one pruned.

Current research indicates that the best pruning time is in the late dormant season, just prior to spring growth. Some follow-up pruning will be needed to remove epicormic sprouts which will develop from dormant buds around the pruning wounds. These sprouts should be removed as soon as possible because they, too, will form knots in the wood.

LITERATURE CITED

- Brinkman, K.A. 1996. Growth and yield on prairie soils. Pp. 50-52. In Black Walnut Culture. USDA N. Cent. For. Exp. Sta., St. Paul, Minnesota.
- Phares, Robert A. 1973. Managing immature trees for more high-quality logs and related products. In Black Walnut As a Crop. USDA N. Cent. For. Exp., St. Paul, Minnesota.
- Schlesinger, R.C. and D.T. Funk. 1977. Manager's Handbook for Black Walnut. USDA For. Serv. Gen. Tech. Rep. NC-38. 22 p.