

Library *cg*

Occasional Report #114

May 1994

**NATURAL STRAIGHTENING OF YOUNG BLACK WALNUT**



By Thomas A. Dierauf and James W. Garner



# NATURAL STRAIGHTENING OF YOUNG BLACK WALNUT

by Thomas A. Dierauf and James W. Garner

## Introduction

Young black walnut trees tend to produce a lot of forks and multiple tops, even as young seedlings. When planted in abandoned fields and pastures (as contrasted to cutover forestland, where competing brush and hardwood sprouts often act as trainers), most black walnuts develop crooked boles, even where corrective pruning is done to remove double and multiple leaders. Crooks and sweeps also arise from causes other than forks and multiple tops. From observation, we know that the crooks and sweeps in young trees tend to straighten, smooth, and fill in as the trees grow larger. This report describes the straightening that occurred over a 21-year-period in four different stands.

## Procedure

Between May 29 and June 14, 1973, we installed a study in four different walnut planting plots that were five or six years old and had grown well (Figures 1, 2, and 3). At age six, average height ranged from 10.3 to 12.5 feet in the four plots. Two of the plantings were on the same tract in Albemarle County and the other two were in Washington and Rappahannock Counties. The studies were installed during the sixth or seventh growing season since planting. The studies involved 20 seedling rows of different initial root-collar diameter.<sup>1</sup> All trees on each plot were graded for straightness of the first nine foot section of the bole. A straight, nine-foot pole was used to find the maximum departure, and the distance between the bole and the near edge of the pole was measured in inches (Figure 4). Trees less than nine feet tall were not graded. We used four straightness classes:

- 1) 0-2 inches
- 2) 2-5 inches
- 3) 5-8 inches
- 4) 8+ inches

In addition to assigning each tree to a straightness class, we recorded the actual departure for each tree.

The first corrective pruning was done after the trees were classified for straightness. No pruning was done (or needed) within the nine foot bole of class 1 trees.

---

<sup>1</sup>Virginia Department of Forestry Occasional Report 57, January, 1981, Black Walnut -Planting, Cultural Treatment, Early Growth.



**Figure 1. Plot in Albemarle County at start of seventh season in the field.**



**Figure 2. Plot in Rappahannock County at start of seventh season in the field.**



**Figure 3. Plot in Rappahannock County at start of seventh season in the field.**

#### Straightness when the Study was Installed

The number and percent of trees in each straightness class is presented in Table 1 for each of the four plots. Class 2 trees were the most common.

The original planting spacing for the four plots was 6.6 by 6.6 feet, giving 1,000 per acre, and so frequent, light, thinnings were started early. By age 26 or 27, when the final evaluation was made, only about a quarter of the trees present at the start still remained (Table 1). We favored the better quality trees in thinning, and so higher proportions of class 3 and 4 trees were removed. However, there were still a few class 3 or 4 trees left on each of the plots when the final evaluation was made.



Figure 4. Illustrating a 5-inch departure on an older tree that was not in the study.

Table 1. Number and percent of trees by initial straightness class when the study was installed and 21 years later.

Class	Carter, Block 2				Carter, Block 3				Lagather				Rouse			
	Age 6		Age 27		Age 6		Age 27		Age 5		Age 26		Age 5 & 6		Age 26 & 27	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	17	23	6	43	10	13	4	22	20	22	8	28	19	19	5	28
2	30	40	5	36	41	53	11	61	42	47	18	62	29	30	10	56
3	22	29	2	14	21	27	3	17	14	16	1	3	22	22	3	17
4	6	8	1	7	5	6	0	0	14	16	2	7	28	29	0	0
Totals	75	100	14	100	77	99	18	100	90	101	29	100	98	100	18	101



### Straightness 21 Years Later

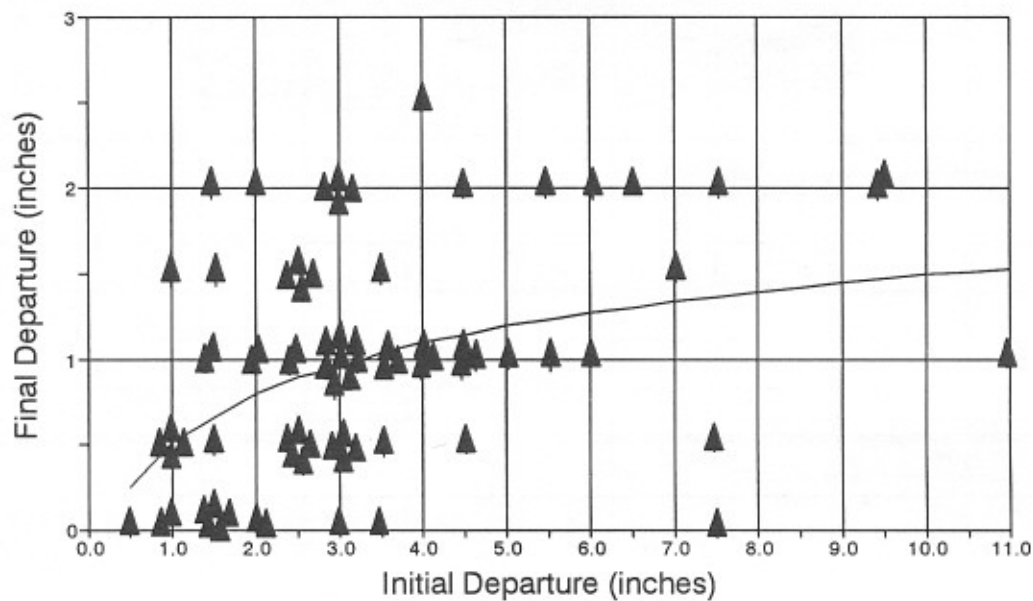
The amount of straightening that occurred surprised us. Of the 79 trees on the four plots at age 26 or 27, only one tree had a departure exceeding 2 inches (Table 2). In general, the more crooked the tree initially, the more it straightened (Table 3 and Figures 5, 6, and 7).

**Table 2. Departure at age 26 or 27 by initial departure.**

Class	Initial Departure (age 5 or 6)	Final Departure (age 26 or 27)						Total No. Trees
		0	½	1	1½	2	2½	
1	½	1						1
	1	2	4		1			7
	1½	5	1	2	1	1		10
	2	2		2		1		5
2	2½		5	2	4			11
	3	1	4	8		4		17
	3½	1	1	3	1			6
	4			3			1	4
	4½		1	3		1		5
	5			1				1
3	5½			1		1		2
	6			1		1		2
	6½					1		1
	7				1			1
	7½	1	1			1		3
	8							--
4	8½							--
	9							--
	9½					2		2
	10							--
	10½							--
	11			1				1
<b>Totals</b>		<b>13</b>	<b>17</b>	<b>27</b>	<b>8</b>	<b>13</b>	<b>1</b>	<b>79</b>

**Table 3. Average departure at age 26 or 27 by average initial departure for the four initial straightness classes.**

Straightness Class	Number of Trees	Average Departure	
		Initial	Final
1	23	1.39	.59
2	44	3.25	1.03
3	9	6.56	1.33
4	3	10.00	1.67



**Figure 5. Departure in inches at age 26 or 27 over departure at age 5 or 6, for the 79 trees on all four plots.** (The fitted curve is the linear regression of the final departure for each tree over the natural logarithm of the initial departure.)



**Figure 6. Rappahannock County Plot at age 26, a tree which had a 1-inch departure at age 5.**





Figure 7. Rappahannock County Plot at age 26, a tree which had an 11-inch departure at age 5; the greatest initial departure of the 79 trees still present at age 5 or 6.

When deciding which trees to remove in a thinning, we tried to favor the straightest trees. Eventually, we realized that many of the class 1 trees were not as vigorous (ie. growing as fast) as many of the class 2, 3, and 4 trees. It seemed that the fastest growing trees were usually not the straightest trees. Consequently, we ended up leaving as many class 2 as class 1 trees, and even retained some class 3 and 4 trees. Where a class 3 or 4 tree was retained, it was usually because there was not a suitable class 1 or 2 tree to leave, and had nothing to do with the comparative straightness of other class 3 and 4 trees on the plot. Consequently, we think that the way we thinned these plots has had little effect on the comparative straightening of the 4 initial straightness classes. Walnut trees tend to produce straight boles over time, and the more crooked the boles, the more they will straighten. Corrective pruning, however, to remove forks and multiple tops promptly (within the potential merchantable bole) is essential in order for natural straightening to occur.



6-94-500ea