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A Comparison of Two Methods of Renovating Intensively Managed Coffee Trees by Drastic Pruning¹

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INTRODUCTION

Intensively managed coffee can be kept in good condition for many years by removing only old or broken branches and excess suckers. Eventually, however, the trees grow together and growth becomes so thick and tangled that heavy loss of berries occurs during picking. Measurements in one such planting showed that almost 30 percent of a 1-ton-per-acre crop dropped to the ground and was lost in picking.

This condition cannot be corrected by removing a vertical branch from each tree every year or so. The remaining vigorously growing verticals provide too much shade for the new suckers which grow weak and whippy. Also, much careful work is required to remove the proper vertical and continuously to remove excess suckers.

The only practical alternative therefore, is periodically to remove the entire tops of the coffee trees, allowing new ones to grow in their places. The current practice of cutting off (stumping) the entire tree about 1 foot from the ground in one operation, however, has not been very successful. Many trees die back, sucker growth is often weak, and severe attacks by the fungus *Cercospora coffeella* are common during the first year or so after stumping.

There is little research information available on the effectiveness of other methods of renovating intensively managed, close-growing coffee trees by drastic pruning.

This paper presents the results of an experiment comparing the current

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practice of stumping with a 2-step system in which all verticals are cut off but one, which is allowed to bear a crop before it also is removed a year later. Results of an experiment to determine the best season of the year for drastic pruning are also presented.

MATERIALS AND METHODS

Ten-year-old, intensively managed coffee trees of the Bourbon variety were used in both these studies. The trees were growing close together in rows 10 feet apart, in full sunlight, at an elevation of 2,500 feet near Jayuya. They had yielded an average of 1 ton of market coffee per acre yearly, and had been heavily fertilized and limed. Pests had been controlled and all old or broken branches and excess suckers had been removed yearly.

The trees received 800 pounds per acre of 12-6-16 fertilizer the first year after pruning, and 2,000 pounds per acre yearly thereafter in three equal applications. Two tons of limestone were applied per acre during the first year. The coffee leaf-miner was controlled by annual applications of Dyston and weeds were controlled by periodic mowing.

Treatments tested were: 1, One-step stumping (see fig. 1): Entire tops of the trees cut off about 1 foot from the ground soon after harvesting was completed in January 1965; 2, two-step stumping: All but one vertical branch cut off about 1 foot from the ground in January 1965. The remaining vertical was cut off in January 1966 after bearing a crop. In both cases only three suckers were allowed to develop on each tree.

Plots consisted of 12 trees with treatments replicated 5 times in a randomized block design.

Yields of market coffee were determined for each plot. The number of trees affected by dieback was determined and sucker growth was measured on all trees in November 1965, 10 months after initial stumping.

In a separate experiment, the tops of coffee trees treated as described above were removed on three dates after harvesting was completed in January 1966 (January 15, March 15, and May 15, 1966). Sucker growth was measured on November 15, 1966. Individual trees were used as plots with all treatments replicated 13 times in a randomized block design. Only three suckers were allowed to develop on each tree.

FIG. 1.—A, Coffee trees being renovated by 2 methods. *Left*—1-step stumping: All vertical branches cut off about 1 foot from the ground in one operation. *Right*—2-step stumping: All vertical branches cut off but one, which is removed 1 year later after bearing an additional crop. Note superior growth of suckers and crop of berries on remaining vertical of tree renovated by 2-step stumping. B, Row of coffee trees being renovated by 2-step stumping. Note vigorous growth of sucker near base of trees. Remaining old vertical will be cut off close to the ground in a few months. (Photographs were taken 6 months after pruning.) C, Same trees 2 years later; note vigorous growth and heavy crop.



RESULTS AND DISCUSSION

Much higher yields were produced by trees renovated by 2-step than by 1-step stumping (table 1). During the first year, the remaining vertical on the trees renovated in two steps yielded an average of 732 pounds of market coffee per acre, whereas the trees stumped in one operation produced no coffee (fig. 1).

During the second year, when all the coffee was borne on new sucker growth, trees stumped by the 2-step system yielded almost three times more market coffee (376 pounds per acre) than did those stumped in one operation.

TABLE 1.—Effect of 2 methods of renovating top growth on yields of 10-year-old intensively managed coffee trees during 2 years following pruning

Replicate	Yields of market coffee (pounds per acre)—			
	First year		Second year	
	2-step stumping	1-step stumping	2-step stumping	1-step stumping
A	900	0	480	340
B	810	0	500	20
C	480	0	350	260
D	440	0	170	40
E	1,030	0	380	10
Average	732	0	376	134

¹ Asterisks indicate differences are statistically significant.

Thus, the coffee trees stumped in two operations produced a total of 1,108 pounds of market coffee per acre during the 2-year period compared with only 134 pounds for the trees stumped in one operation.

Two-step stumping also resulted in a 40-percent increase in sucker growth (fig. 1) as compared with 1-step stumping (table 2).

Furthermore, 4 times more trees were affected by dieback in the plots stumped in one operation than in those stumped in two steps (table 2).

Stumping in March, after the coffee trees had recovered from the strain of producing a crop, resulted in better total sucker growth and a higher monthly rate of growth than did stumping immediately after picking was completed in January (table 3). Delaying stumping until May did not further increase total or monthly rate of sucker growth.

It can be concluded that intensively managed coffee trees should be

renovated when required by cutting back all verticals but one, which is, in turn, cut back 1 year later after it has borne a crop (2-step stumping) rather than by the current practice of cutting off the entire tops in one operation. It also seems preferable to stump coffee several months after harvesting has been completed rather than soon afterwards as at present.

TABLE 2.—Effect of 2 methods of renovating top growth on sucker growth and incidence of dieback, 10 months after pruning 10-year-old intensively managed coffee trees

Replicate	Average height of suckers (feet) ¹		Trees affected by dieback (percent)	
	2-step stumping	1-step stumping	2-step stumping	1-step stumping
A	3.9	3.4	8	25
B	4.3	2.3	8	50
C	3.6	3.6	8	0
D	3.3	2.5	16	42
E	4.6	2.4	0	42
Average	3.94	2.84	8	33

¹ Values are averages of 36 suckers per plot.

² Asterisks indicate differences are statistically significant.

TABLE 3.—Effect of season in 1966, when stumping was performed on intensively managed coffee trees, on subsequent growth rate and height of suckers¹

Item	Stumped Jan. 15	Stumped Mar. 15	Stumped June 15
Average height of suckers on Nov. 15, 1966 (feet)	2.85	3.48	3.1
Average monthly growth rate (inches)	0.36	0.53	0.62

¹ Three suckers allowed to develop on each stump.

² Asterisks indicate differences are statistically significant.

SUMMARY

Renovating intensively managed coffee plantings by 2-step stumping, i.e., cutting back all but one vertical which is allowed to bear an additional crop before it too is cut back, resulted in higher yields of coffee, better

growth of suckers, and less dieback, than did the current practice of cutting off all the tops in one operation (stumping).

Stumping in March after the coffee trees had recovered from the strain of bearing a crop, resulted in better sucker growth than did stumping immediately after harvesting was completed in January.

RESUMEN

En este estudio se compararon dos métodos de poda para la renovación de cafetales bajo cultivo intensivo. El método de cortar todas las ramas verticales excepto una que se permitió fructificar un año adicional antes de cortarla, produjo una cosecha más abundante y un crecimiento más rápido de chupones, y tuvo menos árboles afectados por la gangrena regresiva (*dieback*) que el método corriente de renovación, que consiste en cortar totalmente la copa del arbusto en una sola operación.

Cuando la copa se cortó totalmente en una sola operación, en marzo, después que los árboles habían recobrado el vigor perdido durante la cosecha, hubo un crecimiento más rápido de los chupones que cuando esto se hizo en enero, o sea, inmediatamente después de finalizar la cosecha.