

EFFECT OF LEAF PRUNING LEVELS ON THE YIELD OF COCONUT (A RESEARCH NOTE)

S.S. Magat and J.A. Habana*

The influence on coconut yield (nut and copra) of four leaf pruning levels (LP): control (no LP); LP from leaf #24; leaf #19; and leaf #14, with 31, 23, 18, and 13 remaining leaves in trees, respectively, was studied at the Davao Research Center during a 12-mo period. Leaf #1 is the newly-opened or youngest expanded leaf of palms; leaf #14 - the one supporting fist-size nuts bunch; leaf #19 - supporting 7-mo-old *buko* nuts, and leaf #24 - supporting 12-mo-old harvestable nuts.

Results showed that nut and copra yields of palms at all LP levels were not significantly different from the unpruned palms (control). Apparently, the remaining leaves as low as 13 leaves belonging to the younger group found in the upper part of the crown of trees are more functional and physiologically active (in supporting the developing bunches) than the older and lower leaves (from leaf #14 and below).

The implications of findings in relation to increased sunlight, intercropping, water economy/drought tolerance, pest and disease control, and added income from pruned leaves are discussed. Further studies on the long-term effects and response of palms in dry zones are strongly suggested.

Keywords: Leaf pruning, defoliation, intercropping, crop water economy, pest management.

INTRODUCTION

The effect of the removal or pruning of leaves of coconut on its production is not well understood. In fact, during harvesting, to facilitate the process of cutting harvestable bunches, leaves are usually removed. In Davao, Southern Mindanao, only few leaves (5-10) are left to allow adequate sunlight for the normal development and high yields of intercrops as ramic and other annual crops.

Depending on the extent of pruning of palms, some workers obtained adverse effects (Bailey et al. 1977; Calvez 1976). However, other workers reported beneficial effects of the practice on plants (Gifford and Evans 1981; Detling et al. 1979; Heichel and Turner 1985). In coconut, it should be very useful to understand the response of palms (in terms of nuts and copra) to pruning as this has several implications on

cultural and cropping systems as intercropping, irrigation, drought tolerance, pest control management, as well as additional income from sale of pruned leaves and their by-products.

This paper presents some early findings from a pruning trial conducted at the Philippine Coconut Authority (PCA) - Davao Research Center, Bago Oshiro, Davao City, Southern Mindanao, Philippines.

DESCRIPTION OF FIELD TRIAL

The study was conducted on 35-yr-old Laguna Tall palms grown on Tugbok clay loam soil (typic Tropudalfs), 11 km (inland) from the coast, 120 m altitude. As described earlier (Magat et al. 1981), the soil is deep, well-drained, slightly acidic (pH 6.5), with high base saturation (70%). The area is deficient in N, S, and Cl, thus coconuts are fertilized with $(\text{NH}_4)_2\text{SO}_4$ plus KCl or NaCl, at least every 2 yr. The rainfall during the experimental period appears adequate (Annex 1).

In this trial, the four leaf pruning treatments (LP) with four experimental palms per treatment are replicated four times and laid out in a Randomized Complete Block Design (RCBD).

Mature nuts were harvested every 45 days (8 times per year) in which 20 nuts/plot were sampled for copra weight/nut as basis of copra yield (yield/tree x copra/nut).

The benchmark nut production among experimental plots is very similar (statistically insignificant) and average number of leaves before the LP treatment was 31 leaves. As a point of reference, leaf #1 is the newly opened or youngest expanded leaf. The number of leaves in each treatment were as follows:

TREATMENT	NUMBER OF LEAVES (remaining)
T1 - Control (no LP)	31
T2 - LP from leaf #24 ^a	23
T3 - LP from leaf #19 ^b	18
T4 - LP from leaf #14 ^c	13

a - leaf supports 12-mo-old harvestable nutbunch

b - leaf supports 7-mo-old *buko* (softmeat) nutbunch

c - leaf supports 3-mo-old fist-size nutbunch

* Philippine Coconut Authority - Davao Research Center, Bago Oshiro, 8000 Davao City, Philippines.

Every harvest time of mature nuts (45 days), the remaining number of leaves were maintained at 23, 18, and 13 for T2, T3, and T4, respectively. About 0.75 m of leaf fronds (supporting developing nutbunches) were allowed to remain attached to the trunk.

EFFECTS OF LEAF PRUNING ON PRODUCTION

Results indicate that nut production (per tree per year), weight of copra per nut (g/nut), and yield of copra per tree (kg/palm) of palms with LP did not vary significantly with those without pruning (Table 1). Likewise, the nut production and copra (per nut or per tree) of palms with LP from leaf #24, leaf #19, and leaf #14 did not significantly differ among each other.

TABLE 1. Effects of leaf pruning (LP) on nut production and copra (weight/nut and yield/tree), 1-yr harvest (Laguna Tall Variety), PCA-Davao

TREATMENT	NUT/ TREE (number)	COPRA/ NUT (g)	COPRA/ TREE (kg)
T1-Control (no leaf pruning)	94.1	166.6	15.60
T2-LP from leaf #24	88.8	158.4	13.93
T3-LP from leaf #19	91.9	162.0	14.90
T4-LP from leaf #14	98.4	157.2	15.43
Stat. Significance	NS	NS	NS
S.E. mean	9.1	8.4	1.24
CV %	17.4	9.1	14.60

T1 - normal or natural

T2 - leaves supporting harvestable nuts

T3 - leaves supporting *buko* or nuts with tender meat

T4 - leaves supporting fist-size nuts

This current result suggests that even with the remaining 13-18 leaves, the physiological activities of palms are not impaired, particularly the photosynthesis, respiration, translocation (carbohydrates and fats from functional leaves to developing bunches), and uptake of mineral nutrients. High yields of nuts and copra were maintained. Moreover, it is interesting to note that the upper and younger 13-18 leaves of coconut are more important, functional, and physiologically active than the lower and older 18 leaves (from leaf #14).

Dolar (1961) mentioned the 10-12 older leaves of coconuts have little value to the palm as these leaves had passed their productive stage and thus, could be removed to divert nutrients and other growth factors to more active parts of the palm.

Findings of the current work supports the claim of some workers that when some leaves are removed, the photosynthetic efficiency of the remaining leaves are improved (Das Gupta 1972; Pereira 1978). This is likely attributed to mobile nutrients (as N,S,K and Cl) and water becoming readily available to the remaining leaves (Detling et al. 1979; Heichel and Turner 1983).

The remaining young leaves (13) are apparently adequate to support the normal growth and production of coconuts, as found in the current work. They provide adequate photosynthesis, as these leaves are fully expanded, supporting the claim of Hawkins (1982) and Mooney and Gulmon (1982) that leaves begin to be less active even before clear signs of senescence, and are therefore, likely dispensable for the normal crop production.

IMPLICATIONS OF FINDINGS

On intercropping. The pruning of the 13-18 leaves or maintenance of same number of leaves instead of 28-32 leaves in each tree should be able to allow more sunlight, thus a wider choice of marketable short-season annuals and perennial intercrops. Moreover, as the yield of most intercrops is directly related to the active solar radiation, higher yields are reached resulting in a cropping system that is high in efficiency and is cost-effective (higher net income).

On crop water economy and drought tolerance. The pruning of less functional leaves reduces the water requirement of the palms due to the reduction in the transpiration volume, mainly through the living leaves. The practice of LP from leaf #24, leaf #19, and leaf #14 could reduce transpiration or water requirement of palms by about 25-50%. In areas with distinct and regular dry period of 3-6 mo, that is, monthly rainfall less than 100 mm, LP during nut harvest before the onset of the dry season should minimize the adverse effects of drought on fruit set and production.

On pest and disease control. In cases where damages of pests usually occur on lower and older leaves (leaf #14 to leaf #24), control measures may be ignored as they likely do not affect the physiological activities, especially the photosynthesis of palms. While in the case of fungus diseases of leaves found in said lower leaves, cutting of these to avoid spread to other leaves of the same trees and other trees should be in order, without worry of a significant nut or copra yield reduction. If this is the case, adjustments on the Economic Threshold Level (ETL) in percent damage should be considered.

Finally, pruning the leaves of each bearing tree to a total 19-29 leaves (annual) depending on the practice (from leaf #24, leaf #19, and leaf #14) offers *additional income* for farmers. In some coconut regions, coconut leaves are used for making stick brooms, place mats, fruit baskets, waste baskets, mirror frames, plant holders, roofing and walling materials, etc., produced either in small-scale or medium-scale rural industries. In fact, in the Bicol Region of the Philippines a bundle (5 cm dia.) of dry coconut midrib sells at P2.50-P3.00, while a bundle of dry coconut frond for firewood (0.75-1 m length, 25 cm dia.) sells at P3-5/bundle (Arellano, M. pers comm, 1991). Therefore, this shows that farming communities could derive income not only from selling matured husked nuts, copra, shell/charcoal, and husks/coir fiber, but also from pruned coconut leaves which are indispensable in nut production.

Looking ahead, the long-term effects of leaf pruning on coconut production, as well as on intercrops, particularly those with lower degree of tolerance to shading as legumes, cereals, and selected perennial crops, should be considered.

Also, it is suggested that similar studies on dry coconut zones of the country be conducted.

ACKNOWLEDGMENT

We are grateful to our colleagues: Messrs. Carlos Carpio, Roy Bahala, Leon Alforja, and Manuel De Castro for their review and suggestions. Indeed, these contributed immensely to the clear presentation of the subject. Thanks also to Mr. Joselito Francisco for his skill in the computerized typing of the manuscript.

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ANNEX 1

Rainfall (mm) from September 1990 to August 1991 at the PCA-Davao Research Center (AGROMET STATION, PCA-DRC/PAGASA)

MONTH	RAINFALL (mm)
Sept/90	124.4
Oct	70.5
Nov	267.8
Dec	75.6
Jan/91	148.0
Feb	23.5
March	19.0
April	169.2
May	403.9
June	212.0
July	102.0
Aug	157.4
Total	1,773.3