



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

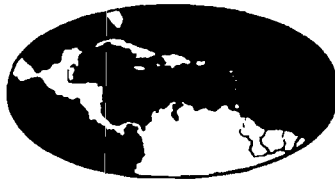
AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

PROCEEDINGS
OF THE
CARIBBEAN FOOD CROPS SOCIETY



THIRD ANNUAL MEETING
RIO PIEDRAS, PUERTO RICO
AUGUST 9-13, 1965

VOLUME III

shipments of fresh fruit by air cargo have been also made to Miami and New York.

The largest proportion of the fruit is sold in the green stage for processing in local canning plants. Fruit is generally processed in heavy syrup in the form of cubes and slices. There are two large processing firms studying the possibilities of canning papaya nectar blended with other tropical fruits like pineapple, guavas and passion fruit. It seems that papaya plantings will expand in Puerto Rico as fast as the canning plants increase the demand for fruit for processing.

* * * * *

CONSERVATION AND HIGH CROP YIELDS ATTAINED WITHOUT TILLAGE ON THREE TYPICAL MOUNTAIN SOILS OF PUERTO RICO

José Vicente-Chandler, Rubén Caro-Costas and
Elvin G. Boneta ^{1/}

INTRODUCTION

Erosion is a serious problem in the Humid Mountain Region of Puerto Rico comprising more than half of the Island. Plowing or cultivation this steep land, or even walking on it after it has been loosened, causes large downhill movement of soil simply in response to gravity. For example, Vicente-Chandler and Smith^{2/} showed that on loose Utuado soil, up to 50 per cent of the erosion losses from cultivated land were accounted for by gravity erosion. Soil loosened by cultivation is also readily washed away by run-off. Thus, one way of reducing erosion losses is to disturb the soil as little as possible.

The present study determined the effect on yields of the major crops of Puerto Rico of thoroughly tilling the soil compared to no tillage, on three typical soils of the Humid Mountain Region.

^{1/}Project Supervisor, Soil and Water Conservation Research Division, Agricultural Research Service, USDA, Agronomist cooperative between the Agricultural Experiment Station of the University of P.R. and the above Division, both stationed at Río Piedras, P. R., and Research Assistant of the Agricultural Experiment Station of the University of Puerto Rico, stationed at Adjuntas, P. R. This paper covers work carried out cooperatively between the Soil and Water Conservation Research Division, Agricultural Research Service, USDA, and the Agricultural Experiment Station of the University of P. R.

^{2/}Vicente-Chandler, J., and Smith, Richard M., Principles and practices of bench terracing in Puerto Rico, Journal of Soil and Water Conservation 6 (3) 134-45, 1951.

MATERIALS AND METHODS

The experiments were conducted on three clay soils (Cialitos, Mucara and Alonso) on about 30 per cent slopes. All crops (tobacco, sugarcane, plantains, taniens, yams, corn, sweet-potatoes, beans) were intensively managed following the best known practices. Annual rainfall averaged about 65 inches fairly well distributed except for a dry period in January, February, and March.

Two levels of land preparation were compared in a paired plot design with 5 replications for each crop. The tilled plots were thoroughly worked to about 8 inches. Weeds were removed from the untilled plots by carefully scraping the soil surface with a hoe. Thereafter, weeds in all plots were controlled by light hoeing.

RESULTS AND DISCUSSION

All three soils have excellent physical condition as shown by bulk densities averaging 1.05 with 15.5 per cent of the pores drained at 1/3 atmospheres of pressure, and averaged 5.1 per cent of organic matter in the upper 6 inches.

Just as high yields of these widely different crops were generally produced on all three soils with no tillage as when the soil was thoroughly tilled (Table 1). The only two exceptions were tobacco on Cialitos clay which produced 15 per cent higher yields with tillage and sugarcane on Mucara clay which produced 21 per cent higher yields without tillage. Differences in crop yields in the three experiments are ascribed to seasonal and climatic variations since the trials were run at different times and locations. High crop yields were produced in almost all cases. In general, adequate moisture was present during germination and emergence was similar in the tilled and untilled plots.

These data suggest that crops can be produced on steep mountain slopes with different systems of "minimum fillage". For example, all vegetation could be killed with herbicides, the desired crop planted directly in the undisturbed soil, and later weed growth controlled by the application of post-emergent herbicides and/or hand weeding. Although much research and testing under farm conditions have yet to be done, preliminary trials conducted by the authors in cooperation with Dr. Héctor Cibes, Plant Physiologist of the Agricultural Experiment Station of the University of Puerto Rico, appear promising.

In one trial, tobacco planted in sod which had been killed by the application of 5 pounds of Dalapon and 2 pounds of 2-4-D per acre and thereafter uncultivated, yielded 1,540 pounds of cured tobacco per acre compared to 1,350 pounds in well plowed plots cultivated twice during the growing season. In another trial, yams growing in undisturbed but weed-free soil treated with 5 pounds of Simazine per acre immediately after planting and receiving no further cultivation, yielded 186 hundredweight of tubers per acre compared

TABLE I

The effect on crop yields of tilling three typical soils of the Humid Mountain Region

Crop	Yield Unit	Cialitos Clay 1962-63		Mucara Clay 1963-64		Alonso Clay 1964-65		Average	
		Tilled	Untilled	Tilled	Untilled	Tilled	Untilled	Tilled	Untilled
Tobacco	Cwt. cured tobacco/acre	15.6*	13.8*	17.2	16.5	23.9	23.3	18.9	17.9
Sugarcane	Tons cane/acre	49.6	48.6	29.4*	35.6*	79	74	52.7	52.7
Plantains	Number/acre	26,500	24,500	26,800	24,960	29,600	28,000	27,333	25,820
Do.	Cwt./acre	175	152	172	169	192	184	180	168
Maniers	Cwt./acre	67	74	119	136	117	96	101	102
Yams	Cwt./acre	142	135	133	121	81	81	118.7	112
Corn	Cwt. Dry corn per acre	35	37	60	55	-	-	47.5	46
Sweet-potatoes	Cwt./acre	90	85	-	-	115	92	102.5	88.5
Green beans	Cwt./acre	-	-	-	-	35	34	35	34

Values are averages of 5 replicate plots of one crop on each soil type with the soil thoroughly worked to a depth of 8 inches in the tilled plots.

*Asterisks indicate differences in yield between treatments indicated are statistically significant.

to 193 hundredweight in well tilled plots handweeded 4 times during the 11-month growing season.

In another experiment, plantains were planted in sod previously killed by the application of 6 pounds of Dalapon and 2 pounds of 2-4-D per acre 2 weeks before planting, followed by an application of PCP in Diesel oil immediately after planting. Four months later the field was sprayed with 6 pounds of Dalapon per acre followed by an application of PCP in Diesel oil 2 weeks later. At 7 months the field was again sprayed with Dalapon at the rate of 6 pounds per acre. Just as high yields were produced with this system as in well tilled plots handweeded 4 times during the crop year.

The greatest advantage of such systems would be to decrease the current, severe erosion losses from these steep, cultivated slopes. Another advantage would be an increase in the productivity of labor and this would seem a much more promising approach to this problem than attempting to partially mechanize the cultivation of steep, irregular, often rocky mountain lands.

SUMMARY

The effect on yields of tobacco, sugarcane, plantains, taniens, yams, corn, sweet-potatoes and beans of thoroughly tilling the soil compared to no tillage was determined on three typical soils of the Humid Mountain Region. All three soils had excellent physical condition with bulk densities averaging 1.05 and 15.5 per cent of the pores drained at 1/3 atmospheres of pressure.

With minor exceptions, similar, high yields of all these widely different crops were produced on all three soils both without tillage and with thorough land preparation. The possibilities of "minimum tillage" systems are discussed.

* * * * *

THE EFFECT OF SHADE TREES ON FIVE CROPS IN PUERTO RICO

José Vicente-Chandler, Fernando Abruña and Servando Silva ^{1/}

This paper presents the results of a study on the effects of shade trees on yields of bananas, plantains, taniens, and tobacco under typical conditions in the Humid Mountain Region of Puerto Rico.

^{1/}Project Supervisor, Soil Scientist, and Agricultural Technician, respectively, Soil and Water Conservation Research Division Agricultural Research Service, USDA, stationed at the Agricultural Experiment Station of the University of Puerto Rico, Río Piedras, Puerto Rico.