PRODUCTIVITY LEVEL OF TEST FARMS UNDER VARIOUS CROPPING SYSTEMS: THE CASE OF THE LAKE BALINSASAYAO PROJECT

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Introduction

One of the objectives of the Lake Balinsasayao project was to test various systems. The tests were intended to identify crop mixes that provide maximum yield.

To do this, around one-half hectare of land close to the Project Center was developed and planted with various crops. The site served as a test farm, a demonstration center and also as a seed bank for various crops. The farmers were provided with actual evidence concerning productive performance of various crops as well as a seed base for crops that they like to grow.

As a seed bank, the farm had already provided seeds to the farmers. These consist of various varieties of beans, squash, tomatoes, pepper, eggplant and other vegetables.

During the last two years of the project, the use of organic fertilizer, composed of dried goat manure, was provided by our goat breeder, an Anglo-Nubian variety. While the breeder can help improve the quality of few goats raised in the area, the breeder can also serve as a fertilizer generator to our test farm. A barn was constructed at the edge of the test farm to facilitate the transport of the manure.

This paper attempts to document the productivity level of the various crops planted and the collective productivity level of mixed crops on our test farms. Relative productivity levels were measured to determine the maximum productive performance of specific crop and the different types of crop mixture. For practical interest, types of crop mixture and specific crops that render higher productivity performance compared to others were selected for possible adoption by the farmers.

METHODOLOGY

Since harvesting was not done once, especially for vegetables, every harvest activity was monitored, information on the use of the farm planted, the quantity of product harvested, the

type of cropping (specialized or mixed) and the crops planted were recorded. The quantity of product was measured using a commercial weighing scale.

Monitoring was not done on the basis of agricultural year. Instead, production was reckoned on the basis of completed production cycle, that is from planting to its complete final harvest. Hence, the reference point of production is land area during completed cropping cycle. In case of mixed cropping, the completed cropping cycle covers from the start of planting up to the complete harvesting of all crops planted.

DATA AND DISCUSSION

Productivity level of four test farms were monitored from December 1987 to August 1988. Each test farm was characterized by different mixes of crops. The intention of the experiment was to find the kind of crop mixes that would yield optimal result. The experiment was set up in this manner since it was assumed that mixed cropping is more efficient than monocropping both in soil fertility use and in pest management and control.

Test Farm No. 1 involved a plot with an area of 1414 sq. m. Starting in December 1987 to August 1988, various crops were planted and harvested from the site (see Table 1). The following crops were planted and harvested: gabi, yam, sweet potato, corn, *habitchuelas* (white beans), string beans, okra, squash. The total monitoring period for this plot was nine months.

Test farm No. 2 consisted of 1,349 sq. m. planted to nine different crops (see Table 2). They include banana, papaya, yam, squash, *alogbate*, baguio beans, camote tops, *gabi* and *ubi*. Production period lasted for eight months starting January 1988 and ended in August 1988.

Test Farm Number 3 only involved an area of 120 sq. m. Two varieties of vegetables were planted: string beans and tomatoes (see Table 3). Production period being monitored lasted for five months, from March to July 1988.

Table 1

Production Data: Test Farm No. 1

Crops Planted	Total Area Planted	Total Kilos Harvested	Months Involved
Gabi	1,414 sq. m.	270.45	December, 1987— August 1988
Yam			
Sweet potato			
Corn			
Habitchuelas			
String beans			
Okra			
Squash			

Table 2

Production Data: Test Farm No. 2

Crops Planted	Total Area Planted	Total Kilos Harvested	Months Involved
Banana	1,349 sq. m.	339.25	January, 19 August, 19
Papaya			
Yam			
Squash			
Alogbate			
Baguio beans			
Camote (tops)			
Gabi			
Ubi			

Table 3

Production Data: Test Farm Number 3

Crops Planted	Total Area Planted	Total Kilos Harvested	Months Involved
String beans	120 sq. m.	24.75	March 1988-
Tomatoes			July, 1988

Test Farm Number 4 covered an area of 1,132 sq. m. There were 12 different crops — yam, sweet potato, tomatoes, okra, papaya, corn, pepper, peanut, onion, Irish potato, ginger and carrots. Production period for this test farm went on for a period of eight months beginning January 1988 and lasting in August 1988 (see Table 4).

Table 4

Crops Planted	Total Area Planted	Total Kilos Harvested	Months Involved
Yam Sweet Potato Tomatoes Okra Papaya Corn Peanut Pepper Onion Irish potato Ginger Carrots	1,132 sq. m.	217.75	January 1988- August 1988

Production was measured by using a commercial weighing scale which was regularly calibrated to maintain its level of accuracy. Table 5 summarizes the productivity level of the four test farms. In absolute term, Test Farm No. 2 provided the highest yield. This is followed by Test Farm No. 1. Since Test Farm No. 3 had the smallest area, obviously we can expect also the lowest yield from it in absolute erms.

On the basis of production per unit area of cultivation, Test Farm No. 2 yielded the highest. Per square meter of land area cultivated this test farm produced .25 kilograms of products from various crops. Using the kind of crop mixes for Test Farm No. 2 it is estimated that a one hectare piece of land for a period of only eight months can produce around 2,500 kilograms of various agricultural products. In this test farm, as we saw earlier, only nine crops were planted such as the following: banana, papaya, yam, squash, *alogbate,* baguio beans, camote tops, *gabi,* and *ubi.* Given these varieties of crops, this would suggest that this test farm has a crop density of about 150 sq. m. to every crop. Since the crops were randomly mixed, we could say that the crops were exposed intensively to others as they grow on the test farm.

If we take the average monthly production of Test Farm No. 2 during the period its productivity had been monitored, Test Farm No. 2 also yielded the highest prouctivity level. It had a monthly yield of around 42 kilograms for an area of only 1,349 sq. m.

The lowest productivity level had been generated by Test Farms No. 1 and No. 4. Both farms recorded a production level of only 19 kilograms for every square meter of land. Test Farm No. 1 had only eight while Test Farm No. 4 had 12 different crops. Test Farm No. 1 had a crop density of around 177 sq. m. per crop while Test Farm No. 4 has 94 sq. m. per crop. It should be noted again that these crops were randomly mixed.

Test Farms Nos. 1 and 4 are estimated to produce around 1,900 kilograms per hectare during a production period of eight to nine months. With an area of 1,414 sq. m. Test Farm No. 3

was estimated to produce around 30 kilograms of agricultural products per month during the nine-month period. For Test Farm No. 4, with an area of only 1,132 sq. m., it was estimated to produce around 27 kilograms per month during a production period of eight months. Test Farm No. 1 is only slightly higher to that of Test Farm No. 4.

Table 3 suggests that the highest yielder among the test farms is the one that is intermediate in terms of the number of crops planted. The lowest yielder test farms, Test Farm No. 1 had eight crops planted while Test Farm No. 2 had 12. The highest yielder, Test Farm No. 2, had nine crops. This indicates that having only eight different crops in a farm means too little which do not optimize production, while having 12 means too dense causing more competition and reducing production. Hence, the optimal level of production can be achieved by having nine different crops planted in a farm. How strong is our conclusion?

Let us answer this question by looking at our Test Farm No. 4. Although the size of the plot in this test was too small to warrant some general observations, perhaps some trends can be identified. This test farm had only two crops planted (string beans and tomatoes) on a very small area of 120 sq. m. yielding around 25 kilograms during a production period of five months. Its production level per square meter is slightly higher than those of our lowest yielder test farms (Test Farm Nos. 1 and 4), but lower than that of our highest yielder test farm (Test Farm No. 2). This indicates that the idea concerning optimal number of crop mix is not a very strong hypothesis to assert. However, it does still remain as a standing hypothesis for further testing in the future since our test case is not large enough to warrant a more definite claim.

Another angle that should be looked into is the quality of the crops mixed. Particular types of crops being mixed may have some chemical interaction which may contribute to low or high productivity. Let us look into this by comparing the crops planted in our highest and lowest yielder test farms.

Table 5

No. Test Farm (1)	Total Area (Sq. Meters) Planted (2)	No. of Months Involved (3)	Total Kilos Harvested (4)	Production per Sq. M. (Col. 4/Col. 2) (5)	Production Per Month (Col. 4/Col. 3) (6)	Estimated Production Per Hectare During the Months Involved (Col. 5 x 10,000) (7)
1	1,414	9	270.45	.19 kg	30.05 kg	1,900 kg
2	1,349	8	339.25	.25 kg	42.41 kg	2,500 kg
3	120	5	24.75	.21 kg	4.95 kg	2,100 kg
4	1,132	8	217.75	.19 kg	27.22 kg	1,900 kg

Table 6

Crops Planted In Low and High Yielder Test Farms

Crops Planted In High Yielder (Test Farm No. 2)	Crops Planted In Low Yielder (Test Farm No. 1)	Crops Planted In Low Yielder (Test Farm No. 4)
[illegible]	Yam	Yam
[illegible]te (Tops)	Sweet Potato	Sweet Potato
[illegible]	Corn	Corn
[illegible]	Okra	Okra
[illegible]	Gabi	Tomatoes
[illegible]	Habitchuelas	Papaya
[illegible] beans	String beans	Pepper
[illegible]te	Squash	Peanut
[illegible]		Onion
		Irish Potato
		Ginger
		Carrots

Table 6 shows crops like banana, *ubi*, Baguio beans and *alog-bate* as peculiar to Test Farm No. 2. These peculiar crops must have significant contribution to high yield for this test farm. The other crops are common to all the low and high yielder test farms. For practical consideration, banana and *ubi* should be introduced in the farm since these crops tend to contribute higher yield to the farm.

SUMMARY

The study revealed that certain crop mix tend to produce higher compared to others. Although still not very conclusive, there appears to be a threshold on the number of crops mixed that will provide an optimal production. Beyond this threshold limit, it may contribute to over competition between various plant species causing a reduced production. Below the threshold, it may not allow optimum use of nutrients causing also low productivity. The right level of mixture has to be determined. This study has provided the lead and more study in the future along this line have to be conducted.

For practical interest, this study suggests that a farm can be optimally producing if the following crops are mixed — yam, camote tops, banana, *ubi*, *gabi*, papaya, baguio beans, *alog-bate*, and squash. Production estimate using this recommended crop mix shows that a one hectare piece of land can produce 2,500 kilograms of various agricultural products during a production period of eight months. Assuming that this agricultural production will have an average market price of ₱2 per kilogram — a one hectare piece of land using the recommended crop mix will be capable of producing ₱5,000 within an 8-month agricultural production.