

HACIENDA MAGNITUDE AND PHILIPPINE SUGAR CANE PRODUCTION *

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THERE ARE NUMEROUS CRITERIA WHICH MAY BE USED for determining the size of farm holding. Acreage or hectarage, the number of workers, the value of the investment, the number of draft animals, and the amount of mechanized equipment are frequently utilized. The most easily obtainable and accurate criterion common to all farms, however, is land. For this study, therefore, the number of hectares per hacienda is utilized for the analysis of the farm size differentials.

Farm magnitude varies interregionally as well as intraregionally. Farm size shows a regional differentiation from country to country and from place to place within a country.¹ Small and medium size farms predominate in most countries, but the meaning of these terms differs from country to country. Generally, small farms predominate in Asia and parts of Europe; medium size farms are characteristic of both North and South America, while large agricultural holdings are typical of Australia.

Internal differences of farm size are apparent in countries. These variations may be attributed to a variety of reasons. However, one of the more important reasons is the crop being raised—specific crops are generally associated with a particular unit area range. On the Victorias Plantation, for example, the monoculture of sugar cane will be indicated as having a very specific association with farms of a large magnitude. For this plantation's agricultural economy, approximately fifty percent of the sugar cane is produced by the large landholders or planters. Especially, the land units for Victorias sugar cane production are much larger than those growing rice in the Philippines.

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¹David Grigg, "The Geography of Farm Size: A Preliminary Survey," *Economic Geography*, Vol. 42 (July, 1966), pp. 206-235.

There is a great diversity of opinion as to the proper size for sugar cane farms.² Some sugar cane farms in the world are divided into tracts of a few acres; but, the plantation and the hacienda dominate as the typical sugar cane producing units and usually exceed one hundred acres.

The hacienda can be considered as a large estate. It is applied, however, in the Philippine sugar cane economy to all farmsteads irrespective of their hectarage. Terminology most commonly used refers to those farms with several hundred hectares as "large" or "large planter" haciendas and the remaining farms as haciendas.

The Victorias Sugar Cane District

The Victorias Milling Company with over 27,000 hectares planted to sugar cane in the mid-1960s is one of the major sugar cane operations in the Philippines. Victorias occupies the northern lowland and adjacent foothill portion of Western Negros Island (See Figure 1, Study Area Inset). This area has a settlement pattern consisting of a series of nucleated communities. These agglomerated settlements contain farms or haciendas growing the sugar cane and a sugar mill or central which initially processes the cane in the form of raw brown or centrifugal sugar mainly for export to the United States. The central is the focal point for the sugar cane district and it establishes a viable economic unit for the plantation-type monocultural economy.

The Objective and Methodology

The basic question to be considered in this study is "How does hacienda magnitude affect the production of sugar cane measured in yield per hectare for Victorias Plantation?" The magnitude of the hacienda is considered in this study to be a significant factor based on yield of sugar cane per hectare. Haciendas indicate a tendency to categorize according to yield based on their hectarage. Analysis initially will be undertaken to cite reasons for the haciendas grouping according to yield-size characteristics. The variations in yield will be considered to be a result of both physical and cultural factors. This analysis of the spatial relationship, the explanation of the differences and similarities of sugar cane production for various hacienda size categories, constitutes the problem.

The analytical procedures utilized can be included into three phases: (1) library investigations in the United States, particularly at the Department of Agriculture Library, Washington, D.C.; (2) field survey in the

² Alden Cutshall, "The Philippine Sugar Industry: Status and Problems," *The Journal of Geography*, Vol. 60 (January, 1961), pp. 5-9; D. A. Maulit, "Farm Size Policy," *Philippine Agricultural Situation*, Vol. 3 (March, 1961), pp. 34-39; Robert E. Huke, "Sugar," *Shadows on the Land*, (Manila: Bookmark, 1963), pp. 297-321.

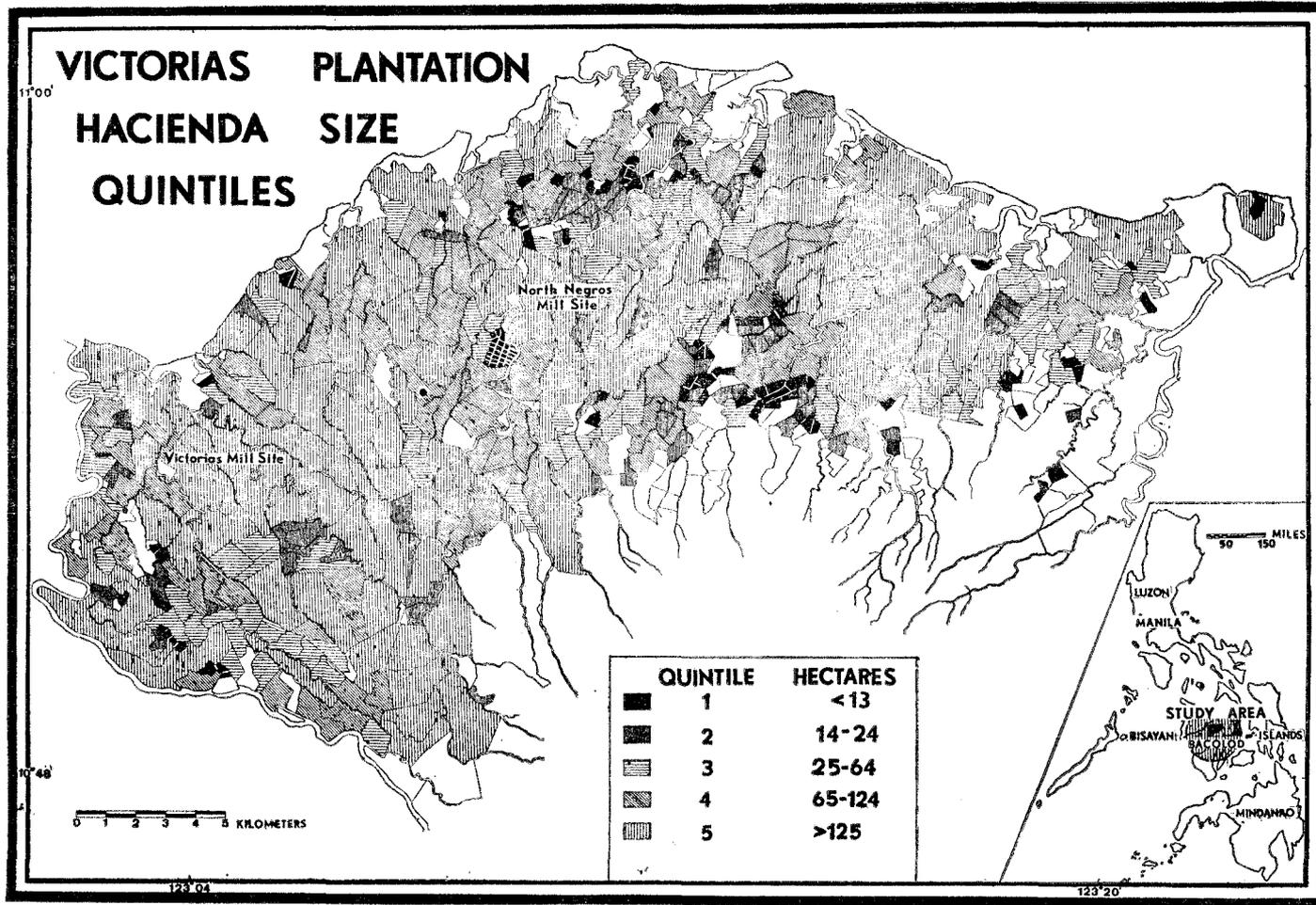


Figure 1. Victoria's plantation hacienda size quintiles. Sources: plantation audit records of Victoria's Milling Company; annual report and summary of raw factory operations, Victoria's Milling Company, 1959; field research 1960-1961.

Victorias Plantation and Negros Island during 1960-1961; and (3) cartographical and statistical analysis of the field findings. Empirical evidence is also utilized to a great extent.

Hacienda Magnitude

The magnitude of the hacienda is considered in this study to be one of the most important factors affecting yield per hectare. To enable analysis the haciendas have been divided into quintiles for examination according to their size differences and similarities. There is justification in utilizing quintile categories for analyzing the effect of hacienda magnitude upon production aspects. Five categories of sugar cane hacienda magnitude, based upon total hectares in each land unit, illustrate most adequately the importance of size. The categories chosen are based upon hectarage quintiles, namely: 1-13; 14-24; 25-64; 65-124; and 125 and above hectares. A total of 577 haciendas are analyzed in this study.

Table 1
HACIENDA SIZE GROUPINGS AND HECTARAGE
FOR THE VICTORIAS PLANTATION¹

<i>Size Quintile</i>	<i>Hectarage</i>	1900 ²	1918 ³	1949 ⁴	1960 ⁵
1	1 — 13	0	9	129	97
2	14 — 24	0	24	100	115
3	25 — 64	10	34	121	127
4	65 — 124	32	58	90	115
5	125 — Above	55	78	105	123
<i>Total Haciendas in the Plantation</i>		97	203	545	577
<i>Total Hectares in the Plantation</i>		16,736	28,746	37,193	37,665

¹ Haciendas have been grouped according to present day quintiles of the total haciendas in the Plantation. This table includes both operating and non-operating farms.

² Size and number of haciendas compiled from the following maps: Cadiz Cadastre, B. L. Case No. 1, GLRO Record No. 196; Boundary and Index Map of Cadiz Cadastre, B. L. Case No. 196; Boundary and Index Manapla, GLRO Record No. 196; Boundary and Index Map of Saravia Cadastre, GLRO Record No. 196; and Boundary and Index Map of Victorias Cadastre, GLRO Record No. 196. (GLRO stands for General Land Registration Office.)

³ Unpubl. MS. Cadastral Surveys of 1915 and 1916 as approved by the Director of Land; Sugar Plantation Audit Records of the Victorias Milling Company and North Negro Sugar Company, 1918.

⁴ Unpubl. MS. "Annual Report and Summary of Raw Factory Operations, 1949-1950," Victorias Milling Company, Victorias, Negros Occidental, pp. 172-188.

⁵ Unpubl. MS. "Annual Report and Summary of Raw Factory Operations, 1959-1960," Victorias Milling Company, Victorias, Negros Occidental, pp. 184-196.

The magnitude characteristics utilized to explain the hacienda production patterns are based on yield per hectare for six criteria. These are as follows: (1) the historical factor; (2) the *lusoc* system; (3) equipment and field operations; (4) quota system; (5) transportation of the cane from the hacienda to the central; (6) the availability of credit. It should be indicated that other variables have importance for yield variations such as land tenure,³ but only the above six are selected for analysis.

The Historical Factor

For the Victorias Plantation the haciendas have been increasing both in total number as well as areal extent. Table 1 indicates a significant fact is the numerical increase of haciendas for the years 1900, 1910, 1949, and 1960. A major trend for the plantation has been a rapid increase in the number of individual hacienda units.

The area occupied by the sugar cane haciendas, also, has been increasing as indicated by Table 1. In the earliest period around 1900, only 16,736 hectares compared to 37,665 hectares in 1960 were occupied by the sugar cane landholdings. Most of the haciendas in 1900 were located on the coastal margin and lowland sections of the plantation. The district has been gradually encroaching toward the more undulating interior of Negros. In the 1950's the plantation had become relatively stabilized in its areal extent. During recent years, however, additional expansion of hectarage toward the island's interior has taken place as new markets became available.

Sugar milling has progressed through three distinct occupance stages. The first, the middle 1800's to 1920, was the "self-contained" hacienda where a primitive sugar establishment, known as a muscovado mill, extracted the sugar from the cane produced on the farm. The processes were crude and sugar extraction was very inefficient.

The establishment of the centrals, one of the present-day Victorias mill site and another at the North Negros mill site (see Figure 1), followed in the 1920's. This era, 1920-1945, initiated the separation of the production and extraction stages in sugar cane agriculture for Victorias. Now sugar cane was only to be grown on the hacienda and sugar was to be extracted from the sugar cane stalks at the central.

The last occupance period, 1945 to the present, began soon after the Second World War when it was decided not to rebuild the destroyed mill of the North Negros Sugar Company and to reconstruct only Victorias Central. The amalgamation of the two districts into the present-day Victorias Plantation is the focal point of this study and represents the agricultural situation being considered.

³ See the author's study, "A Philippine Sugar Cane Plantation: Land Tenure and Sugar Cane Production," *Economic Geography*, Vol. 43 (April, 1967), pp. 157-169.

The coastal lowland haciendas have been growing sugar cane for over one hundred years and are associated with the muscovado mill areas. By cartographical analysis of a map showing the muscovado mills being compared to a map depicting yield per hectare, it is found that all except ten of the ninety-seven muscovado mills are associated with the highest yielding haciendas. This provides evidence that the most fertile land for sugar cane cultivation was initially put into production.

Recent additions to the district have fringed the best land for sugar cane agriculture, most accessions being toward the interior of Negros. The mountain-foothill haciendas and the more undulating haciendas were developed for sugar cane planting in the 1930's. Some were not cultivated until after the Second World War. The clustering of the smaller haciendas in the district's interior periphery can be partially attributed to the homesteading promoted by the Philippine government in the 1930's. A limit of 16 hectares per person was initially applied to landholdings, explaining why so many farms in one size quintile (14-24 hectares) are found in the interior fringes of the plantation. Clustering of the haciendas according to size groupings can be observed in Figure 1. Subsequent land purchases and reorganizing of the haciendas by inheritance have somewhat altered this pattern.

Lusoc System

A discussion of the farming system associated with the Victorias Plantation must also be utilized for assisting in the explanation of the relationships of large yields per hectare with the larger haciendas. For the Victorias District the *lusoc* system is utilized. The *lusoc* system is the practice of planting sugar cane in a field immediately after a crop has been harvested. This implies that the haciendas with a larger hectarage will have more choice for aspects of sugar cane production than the smaller size hacienda. To illustrate the farming situation associated with various size haciendas, typical example of a small hacienda (less than 13 hectares), an average hacienda (25-64 hectares), and a large hacienda (greater than 125 hectares) are analyzed cartographically on Figure 2.

The small size hacienda portrayed (Figure 2, Inset A) has two contrasting situations for different months. The hacienda was first surveyed in November. At this time, the sugar cane was mature and ready to be harvested. Three months later, in February, this hacienda had a new sugar cane crop planted. It was indicated from field interviews that the sugar cane had been harvested from December to early February and a new crop had been planted in the latter part of February. The cropping system which characterizes a small hacienda indicated little choice in planting and harvesting. For all the plantation's haciendas next year's crop is customarily planted imme-

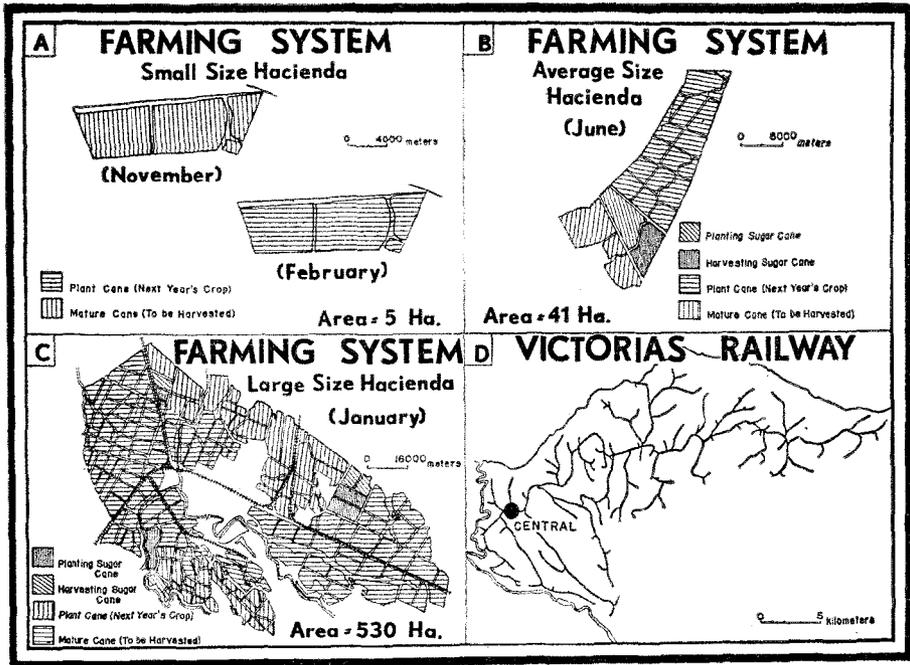


Figure 2. Farming systems for various size haciendas and Victorias Railway. Sources: Hacienda subdivision maps of Victorias Milling Company; Victorias Milling Company railroad system map; field research 1960-1961.

diately after harvesting a field. All sugar cane, therefore, on a small hacienda will be approximately the same age, which means that weather conditions or any natural phenomena adverse to sugar cane growing will likely affect the whole crop. Furthermore, the small hectarage of the landholding will result in the fields being very similar with respect to physical characteristics such as soil type, slope, and drainage.

An average size hacienda (25-64 hectares) is portrayed in Figure 2, Inset B. This farm was surveyed in June, and it was found that over seventy per cent of the sugar cane had been harvested in the crop year with approximately three months harvesting remaining. All except one field had already been planted to cane or was being ratooned, one field was being planted, an adjoining field was being harvested and twenty-five per cent of the cane was mature or maturing and was scheduled to be harvested on this crop year. A farm of this size will generally be harvested on a year-round basis using the *lusoc* cropping system. All of the various stages of the farm-

ing system—planting, harvesting, a portion of the farm in plant cane (next year's crop), and part of the hacienda in maturing cane (the crop ready to harvest or being harvested) will be found. The staggering of the stages of sugar cane cultivation is an advantage for the average size hacienda in obtaining a higher yield; the likelihood of a total crop failure from short term weather or other physical conditions adverse to sugar cane cultivation is minimized. Since the hacienda's fields will have sugar cane at varying stages of maturity, this means that the crop in different fields will have varying tolerances to adverse growing conditions.

The large size hacienda (greater than 125 hectares) is also illustrated in Figure 2, Inset C. It can be seen that more choice in sugar cane cultivation exists with increasing size of this hacienda compared to the other two categories, although the *lusoc* system is still used. This hacienda has three different portions blocked out for separate operations; land preparation, planting, and harvesting of the sugar cane were going on in three sections of the landholding. Also, a portion of the hacienda was in plant cane. The essential difference between this size hacienda and the average size landholding is the elaboration or multiplicity of operations. More cane fields exist on the larger haciendas. Year-round harvesting and planting of sugar cane will be found on a hacienda of this size. Since the hacienda will have various maturity stages for its sugar cane and several fields in similar maturity stages, the likelihood of a failure in overall yield is almost eliminated.

Cartographical analyses indicated that hacienda size is an important factor affecting the hacienda's yield per hectare. Table 2 provides a summary of yield per hectare and farm magnitude. The highest yields per hectare are associated with the larger landholdings. The haciendas producing large yields per hectare are in size quintiles 3, 4, and 5—haciendas exceeding 24 hectares. Those landholdings producing low yields per hectare are in size quintiles 1 and 2—haciendas having less than 25 hectares.

Haciendas producing particularly high yields per hectare are associated with the larger landholdings; this is indicated by comparing yield per hectare and hacienda size quintiles. This implies that economies of scale as they are related to the *lusoc* system are related to hacienda magnitude. Also, the large haciendas are generally associated with the portions of the district in which sugar cane was initially cultivated. It can be further inferred that inertia factors continue to operate for this area, since it continues to be the most productive land for sugar cane.

Table 2
YIELD PER HECTARE AND HACIENDA MAGNITUDE
FOR VICTORIAS IN 1960¹

<i>Yield per Hectare in Piculs</i> ²	>125	101-125	76-100	51-75	<50
<i>Size Quintile in Hectares</i>	<i>Number of Haciendas</i>				
> 125	26	42	10	2	0
65 — 124	21	34	18	6	1
25 — 64	20	33	20	4	3
14 — 24	13	22	18	18	9
< 13	2	12	33	23	10

¹ Number of haciendas in each size quintile category and number in each yield per hectare category.

² The average yield per hectare in this crop year (1959-1960) was 117 piculs.

Equipment and Field Operations

This is the age of technological revolution in agriculture. Human power has been replaced by animal power with the latter being displaced by mechanical equipment. However, the latter revolution is only beginning in the Victorias Plantation. Humans and animals remain dominant sources of power.

Some Victorias sugar cane operations, such as land preparation, dominantly use mechanical power sources. Other tasks such as the cultivation and hauling of cane from the field to the railroad loading stations utilize animal power. The majority of the power is furnished by humans, particularly for weeding, planting, fertilizing, and harvesting. Nearly eighty per cent of the Victorias Plantation's labor inputs, measured in man-hours, are obtained from non-mechanical sources, primarily the man and the water buffalo or *carabao*. In fact, it probably will be years before mechanization will characterize this sugar cane area and a neo-plantation economy will be dominant.

The fact that animal, and especially human power dominates, is contrary to general world conditions of sugar cane agriculture. Mechanization of field operations, from initial clearing of the land to transport of the harvested cane, is now commonplace.⁴ Since the world picture of sugar cane farming has been toward the utilization of machinery, the following discussion of equipment and field operations associated with hacienda magnitude will indicate their importance to sugar yield.

The degree of mechanization increases with the size of the hacienda. Table 3 utilizes two factors to indicate that increased use of agricultural machinery tends with a greater unit of land: (1) the number and per cent of haciendas owning a tractor for each size category; and (2) the number and per cent of haciendas using the tractor for land preparation. Interpreting Table 3, it can be seen for categories 1 and 2 that ownership of mechanical equipment by individual haciendas is practically nil. Category 1 has only one hacienda owning a tractor, and this particular land unit was farmed in conjunction with three others. The 14-24 hectare haciendas exemplify what should be expected as to tractor ownership. It has been found virtually impossible for a small size holding to afford the expense of purchasing a tractor. However, two distinctions exist between categories 1 and 2. Less than one fifth of the former category use tractors compared to over one half of the latter group. This can be explained in that fifty per cent of the 14-24 hectare haciendas are planted by one of the larger sugar cane planters who lease the holding and bring their tractor for land preparation. The remaining half are planted by people living on the land units. These are essentially "homestead" sugar cane farms and generally are occupied by first or second generation "pioneers," who cannot afford a tractor but still wish to work the land.

Table 3

NUMBER AND PER CENT OF MECHANIZED HACIENDAS

<i>Size of Hacienda</i>		<i>Total No. Hda. Interviewed</i>	<i>Hdas. with Tractors</i>		<i>Land Prep.¹ by Tractor</i>	
<i>No. of Hectares</i>			<i>No./Per Cent</i>		<i>No./Per Cent</i>	
<i>Category/Hectareage</i>						
(1)	1 — 13	22	1	4.5	3	13.6
(2)	14 — 24	19	0	0	10	52.6
(3)	25 — 64	34	12	35.3	27	79.4
(4)	65 — 124	36	23	63.9	28	77.8
(5)	125 — above	47	40	85.1	45	95.7
Total		158 ²	76		113	

¹ Some land preparation (ploughing and harrowing) may use carabao, but tractor is used for more than fifty per cent of each hacienda's area.

² Stratified random sample based upon the total number of haciendas existing in the District. A greater number of farms were interviewed in categories 3 through 5 because of the larger hectareage they occupy.

⁴ A. C. Barnes, *Agriculture of Sugar Cane* (London: Leonard Hill, Ltd., 1953, p. 257.

Those haciendas having 25-64 hectares depict the situation of higher tractor ownership per hacienda with almost eight of ten land units using the tractor for land preparation. With only one third of the haciendas associated with tractor ownership, it is evident that these land units involve either rental from another planter or are farmed as part of several landholdings.

The next two size categories are the most mechanized. The haciendas with 65-124 hectares indicate that sixty per cent of the planters utilize a tractor. In category 3, eighty per cent use the tractor for land preparation. The largest haciendas, 125 and above hectares, represent the largest planters with eighty per cent owning a tractor, but almost all using the mechanical method of land preparation. In fact, the two large haciendas not using the tractor for land preparation were both mountain side holdings where rocks and steep slopes prevented utilization of tractors and plows.

The use of the tractor was found to result in much higher production than the utilization of the *carabao*. The sugar cane farmer, who utilizes the *carabao* for land preparation, usually produces less sugar cane per hectare than those utilizing the tractor. The negative relationship shown between *carabao* preparation and yield per hectare is indicated in Table 4. It is recognized that other factors, both cultural and physical, are related as well as interrelated to the type of power used for land preparation. It is considered that significant yield differences can be accounted for according to the method of land preparation.

Table 4

LAND PREPARATION AND YIELD PER HECTARE SUMMARY ¹

<i>Yield per Hectare in Piculs</i>	<i>Haciendas Using the Tractor</i>	<i>Haciendas Using the Carabao</i>
> 125	25	1
101 — 125	24	7
76 — 100	6	20
51 — 75	4	8
< 50	1	4

¹ Twenty-five per cent sample of operating haciendas.

The fact that large haciendas utilize mechanical equipment and small haciendas utilize animal power is a very significant factor in understanding yield differences. The expense of mechanical equipment is generally too great for a sugar cane planter who owns less than twenty-five hectares of

land. With the fact that yield per hectare is directly associated with the type of equipment utilized, it can be indicated that the size of the farm is a significant factor with respect to the yield of sugar cane.

The Quota System

The sugar quota's effect on the agricultural patterns of the Victorias plantation has a definite consequence on the yield characteristics for the individual haciendas. The production for overseas consumption dominates with approximately eighty per cent of the production being exported in most years. Almost all of the sugar is destined for the United States market.

The United States' sugar quota is not world-wide in its application. Normally, only certain sugar producing countries fall under its agreements. Each of these countries, such as the Philippines, receives a "pegged" market price for a specified amount of sugar. The amount the United States pays is substantially above the world market price, usually two to four times as high.

The quota systems initiation in 1934 coincided with the approval of the Philippine Independence Act or the Tydings-McDuffie Law, which created provisions for Philippine independence as well as allotting 850,000 long tons of sugar exports to the United States.⁵ The Philippine Legislature, in compliance with the decision of the United States Congress, enacted "The Sugar Limitation Law," which declared the control system for sugar cane production on the haciendas.⁶

The allocation of the sugar quotas was based upon the average production of the three calendar years 1931, 1932, and 1933.⁷ The distribution was based upon a coefficient of the total centrifugal sugar production of the Philippines, the per cent of total production for each milling district, and the per cent of each milling district's portion produced by each hacienda for the three calendar years. This enabled the apportionment as to the number of piculs, 139.44 pound units, per hacienda.

Philippine sugar production has been and continues to be geared to the country's quota requirements for the United States with a basic quota of 1,050,000 short tons, as well as Philippine domestic requirements and a non-specified world quota granted by the International Sugar Council. These tonnages are allocated by the Philippine Sugar Quota Administration to the Philippine sugar growers.

⁵ E. D. Hester, "Philippine Sugar Control," *Sugar News*, Vol. 17 (August, 1936), p. 325.

⁶ Salvador S. Marcelo, "Philippine Sugar Laws, Rules, and Regulations," *Sugar News*, Vol. 28 (May, 1952) pp. 202-203.

⁷ *Ibid.*, pp. 205-207.

The present export quotas of the district's haciendas were obtained by a variety of methods. A landholding's export quota may be attributed to: (1) the original allocation based upon its production in 1931-1933; (2) purchasing an export quota from one landholding and attaching it to another hacienda (export quotas can be purchased and sold the same as land⁸); (3) transferring the quota from one hacienda to another within the same milling district.

The export quota belongs to the quota holder and can be attached to a given hacienda or held as personal property without any land ownership.⁹ Domestic quota is attached to the land and can only transfer with the land.¹⁰

Almost one half of the district's quota is held by twenty-eight planters. In 1960, there were approximately 450 sugar planters in the Victorias milling area, so this means that six per cent of the planters control nearly fifty per cent of the quota.¹¹ These twenty-eight planters control forty per cent of the hectareage and produce nearly half of the total sugar cane in the district. The district is controlled by a few of the largest planters since policy-making votes, especially the allocation of the *vagons* for transporting cane from the hacienda to the mill, are apportioned according to the quota. The remaining 422 planters average a few hundred piculs quota.

The allocation of the export quota would indicate that the manipulation and use of the quota is a governing factor as to sugar cane production for each hacienda. There were 567 registered haciendas in the district, but only 436 produced sugar cane for the 1958-1959 crop year.¹² The 131 non-producing haciendas lack an export quota, so the presence of the export quota appears to indicate whether a hacienda will have sugar production. There are widespread implications as to the effect of the quota system on the district's land use patterns. Certainly much less sugar cane would be grown here if the quota did not guarantee a market with a favorable price. The individualism of the farmer is basically eliminated in the choice of crop, as sugar cane brings in so much more money than other crops. The quota will be in existence until 1974 under present agreements.¹³

⁸ Actually the quota gives value to the land and rarely is a hacienda purchased without quota. Haciendas sell at so much per hectare, which is based upon the amount of export quota per hectare.

⁹ Civil Case No. 12540, Republic of the Philippines, Court of First Instance, Manila. "Eduardo Suarez and Jose Narciso Versus Mount Arayat Sugar Company, Inc.," *Sugar News*, December, 1952, pp. 577-588.

¹⁰ Personal communication, Carlos L. Locsin, Pres., Victorias Milling Co., 1961.

¹¹ Unpubl. Ms. "List of Plantation Owners who have subsisting written milling contracts with the Victorias Milling Company as of June 17, 1960, showing their haciendas, its plantation audit numbers, and its corresponding sugar quota basic allotments for crop year 1959-1960" (31 typewritten sheets).

¹² Annual Report Victorias Milling Company, 1959.

¹³ The Victorias Milling Company has an agreement with the planters affiliated with the Company for the period November 1, 1955 to October 31, 1974.

An artificial agricultural system is created under the quota system. The quota allocations for the haciendas are based upon production in the early 1930's when yields were less per hectare than the 117 piculs per hectare average in the 1960's. Since the total amount of the quota has only been slightly increased, it is logical to suspect that the planters are producing less sugar than possible. The quotas are too low for the present day production capabilities. Since other agricultural land use is disliked by the planters, the haciendas are utilized only partially or at the best quite inefficiently. For example, one hacienda administrator stated, ". . . the rice producing potential of the Victorias area has not even been discovered."¹⁴ The simple truth of the matter can be summarized by stating that most of the sugar cane planters of the Victorias Plantation lack the courage to stop planting only sugar cane or think the profits from cane so rewarding that an attitude of "Why bother!" has developed. Many hectares of the Victorias area are not being utilized to their greatest potential — even when sugar cane occupies the whole portion of a field. In most years the quota and total production will not vary by more than a few thousand piculs. The hacienda's sugar production is geared to the quota.

Transportation

Transporting harvested cane from the field to the mill is the primary purpose of the centrals' railroad. With over 300 kilometers of trackage, the railroad connects most of the Victorias' haciendas to the mill (Figure 2, Inset D). The dominant function of the railroad is hauling harvested sugar cane to the mill, which accounts for nearly eighty-five per cent of the tonnage.

For Victorias, the exclusive use of the centrals' railroad for transporting cane to the mill is closely associated with hacienda magnitude and sugar cane production on the hacienda. The availability of railroad cars or *vagons* for hauling cane is a major factor related to sugar production.

The number of cars or *vagons* which are assigned, locally referred to as *repartos*, is undertaken by a planter's committee. This committee is primarily composed of the largest sugar cane planters in the district. Car assignment is theoretically based on need as well as upon available cars and the number of requests. However, a small planter may request cars but since he is not represented in the assigning group may not receive any or possibly insufficient cars for hauling his cane to the mill. It was generally observed that the larger planters essentially received their requests.

Hauling the cut cane from the field to the mill is a major factor to be considered in yield. Unnecessary delays in transporting the cane result in excessive sugar conversion and lower sucrose recovery in milling. There are

¹⁴ Personal interview, Administrator, Hacienda Bayabas, 1960.

two particular places where stockpiling of cane may drastically reduce yields — the field and the mill yard. The initial place is the field itself, especially where there is a failure to mill the cane within twenty-four hours. Since cane has to be cut in anticipation of the availability of the railroad cars, the failure of sufficient cars to arrive for hauling the cane results in lower sucrose recovery and possible sugar conversion. The small planters' inability to have sufficient *vagons* for shipping their cane was observed, and it undoubtedly provides partial explanation for the lower yields per hectare on the small size haciendas.

Credit Availability

Credit or cash advances on a sugar crop is a major factor in sugar cane agriculture, especially for land preparation, planting, and fertilizer. A primary source of credit is from the Philippine National Bank. One bank official stated during field research that, "I won't give any equipment loans to haciendas with less than thirty hectares for sugar cane; from there to one hundred hectares I question the loan; over one hundred hectares, the loan is essentially automatic." The small planter is less available to command crop loans. Further importance to the allocation of credit is associated with export quota being associated with greater loan privileges than domestic sugar. Furthermore, the small planter may also not understand the need for obtaining loans for financing production. Many examples can be cited, but this case may be illustrated by the small planter who refused to borrow for fertilizer, even though he had no funds to purchase it, because he wanted to run the farm without outside interference. He later lost his farm. The large planter with a substantial export quota has definite credit advantages in sugar cane production.

Summary

To determine the spatial variation of sugar cane yield per hectare and its association with hacienda magnitude, the Victorias Plantation's haciendas have been studied. Sugar cane yield per hectare is closely related to hacienda magnitude. It has been found that as the hectarage of a hacienda increases, the yield per hectare generally increases. Lower yields per hectare are associated with the smaller farms, particularly those landholdings with less than twenty-five hectares. The larger the hacienda the more likely its yield per hectare will approximate or exceed the district's average yield. Sugar cane yield per hectare, in general, corresponds closely to hacienda size.

Factors affecting yield per hectare are also closely interrelated to hacienda magnitude. The smaller farms are generally located in the district's more sloping portions which have the less fertile soils, resulting in lower

yield per hectare; the largest haciendas are generally located in the more fertile soils of the plantations lowland—the area where the muscovado mills were established. Planters of the larger haciendas can afford utilization of mechanical equipment, either rented or purchased, while the smaller planters, those having less than twenty-five hectares, generally rely upon animal power. The *lusoc* system is more advantageous to the larger planters than to the smaller ones, the larger landholdings will have sugar cane in all stages of maturity so an overall failure in yield is minimized. Allocation of railroad cars or *vagons* by the planters is essentially weighted in favor of the large landholder. Credit can be obtained more readily by the larger planters, especially by the holders of a large export quota who have a guaranteed market, specifically to the United States, for their sugar output.

Over a period of time, the small Victorias sugar planter will probably be eliminated. The advantages accrued to the large planter landholding with respect to economies of scale seem to indicate continued domination of sugar output by a small percentage of the sugar planters on the Victorias Plantation. From this case study it can be indicated that for the economic development of the Philippines and for the sugar export economy, the magnitude of sugar cane landholdings is a factor which must be considered.