

ABSTRACT

Cane Farming in the Trinidad Sugar Industry

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by Dayanand Maharaj

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community. Today the sugar industry is experiencing a critical period in its history, as with current cost conditions the plantation sector strives to attain full-scale mechanization. In this respect policies have to be formulated that will prevent serious social dislocation which could derive from mechanization. The aim must also be to create vibrant and progressive communities able to attain reasonable living standards while utilizing scarce resources efficiently. The dilemma in rural progress in social and economic terms, is in deciding what form development should take for both plantation and peasant, or what is an acceptable balance between the two.



ABSTRACT

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Sugar cane is being produced in the Caribbean under both the plantation and peasant systems of agriculture. This dualism is not only characteristic of Trinidad and the Caribbean, but also of other sugar cane producing countries in the Tropical world. Current problems facing Caribbean territories, namely increasing populations, unemployment, limited land resources and lack of capital for industrialisation make it necessary to study systems of cultivation so that development can be purposefully planned.

Historically, in the Caribbean, export crops based on the plantation system have dominated both agriculture and the entire economy. The provision of an infrastructure and services were directed primarily to the benefit of the large estates. This equally applied to the provision of labour supplies, for the peasantry of today grew out of the needs of the plantations and was consequently affected by their requirements, with tenurial rights in some islands remaining almost the same as in the pre-1838 era. This left little scope for the development of prosperous rural communities. Today the sugar industry is experiencing a critical period in its history, as with current cost conditions the plantation sector strives to attain full-scale mechanisation. In this respect policies have to be formulated that will prevent serious social dislocation which could derive from mechanisation. The aim must also be to create vibrant and progressive communities able to attain reasonable living standards while utilising scarce resources efficiently. The dilemma in rural progress in social and economic terms, is in deciding what form development should take for both plantation and peasant, or what is an acceptable balance between the two.

This study provides a view of peasant cane farming in Trinidad. Its development is traced briefly, followed by a description of the operation of the whole industry and its impact on the landscape. This is followed by a more detailed treatment of cane farming in which consideration is given to the physical, structural and institutional framework within which peasant cane farming operates. Sufficient information was not available from documentary sources so it was necessary to carry out field studies in the form of the construction of a land-use map and a questionnaire survey among the cane-farming population.

From studies of the data collected, it is the opinion of the present writer that size of holding is the major factor affecting production in the peasant sector. This is shown through the interaction of farm-size, capital inputs, yields and other related variables. It is suggested that integrated attempts at planning must be made in order to transform peasant producers into efficient users of limited land resources and that haphazard and laissez-faire attitudes should be reformed.

In a changing Caribbean scene where social and economic objectives are sometimes contraposed, it is necessary to chart courses carefully. Both types of objectives are now being considered more closely than earlier in the history of these islands. It is hoped that this study portrays some of the constraints which prevent the development of the most important form of peasant commercial agriculture in Trinidad, and also in the entire Caribbean region.

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It is incumbent upon me at this point to mention that although I was assisted in many ways by a large number of people, any failings in this thesis are my own responsibility.

Dayanand Maharaj

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List of Abbreviations

B.C.	- Brechin Castle mill.
C.F.D.	- Cane Farming Department.
C.S.A.	- Commonwealth Sugar Agreement.
F.P.	- Forres Park mill.
I.C.T.A.	- Imperial College of Topical Agriculture, now the Faculty of Agriculture, U.W.I.
I.S.A.	- International Sugar Agreement.
I.S.E.R.	- Institute of Social and Economic Research, U.W.I.
mnt.	- million metric tons.
MX.	- Mamoral Crossing.
na.	- not available.
nd.	- no date.
negl.	- negligible.
Tc/A.	- tons cane per acre.
Tc/Ts.	- ratio of tons cane required to make one ton of sugar.
T.I.C.F.A.	- Trinidad Islandwide Cane Farmers' Association.
T.S.E.	- Trinidad Sugar Estates' mill, the Orange Grove mill.
U.W.I.	- University of the West Indies.
W.L.	- Woodford Lodge mill.

One pound sterling = \$4.80 TT. (Trinidad & Tobago dollars).

One dollar TT = 4/2d sterling.

INTRODUCTION

The purpose of the study is to investigate the organisation and operation of peasant cane farming in Trinidad in broadly geographic and economic terms. The peasant system of cane farming is part of the typology of Caribbean agriculture which generally exhibits two main systems of organisation, the other being the plantation system. The plantation system is characterised by large scale units employing, traditionally, a great deal of cheap labour and a considerable degree of metropolitan control. Production is destined almost exclusively for export, with sugar cane being the main crop. The major features of the peasant system are its large numbers of small holdings, its employment of both family and hired labour, the latter where a crop is grown for commercial purposes by peasants, and its system of mixed production, but verging on monoculture in certain areas. Other features of the West Indian peasantry are its recent origin, for it had no chance of developing prior to 1838¹, and its combination of various other activities with agriculture; for supplementary employment in trades, shopkeeping and agricultural work on plantations are characteristic of the peasantry. For historical reasons resources are unequally distributed between both systems and there is also great disparity in the productivity of peasants and plantations, with peasants being in the weaker position. This situation emanates directly from the unequal distribution of resources.²

-
1. See Marshall, W.K., "Peasant development in the West Indies since 1938" in Social and Economic Studies, Vol. 17, No. 3, 1968, University of the West Indies, for a discussion on the development of the peasantry in the Caribbean, pp. 252-263.
 2. Beckford, G.L., "An appropriate theoretical framework for agricultural planning" in Social and Economic Studies, Vol. 17, No. 3, 1968, puts forward the hypothesis that 'underdevelopment in the Caribbean emanates directly from ... the plantation system of resource organisation. And the problem of development is one that must involve changes in that structure.' p. 242.

100 PERCENTAGE OF CANES PRODUCED BY FARMERS AND ESTATES 1900-1967

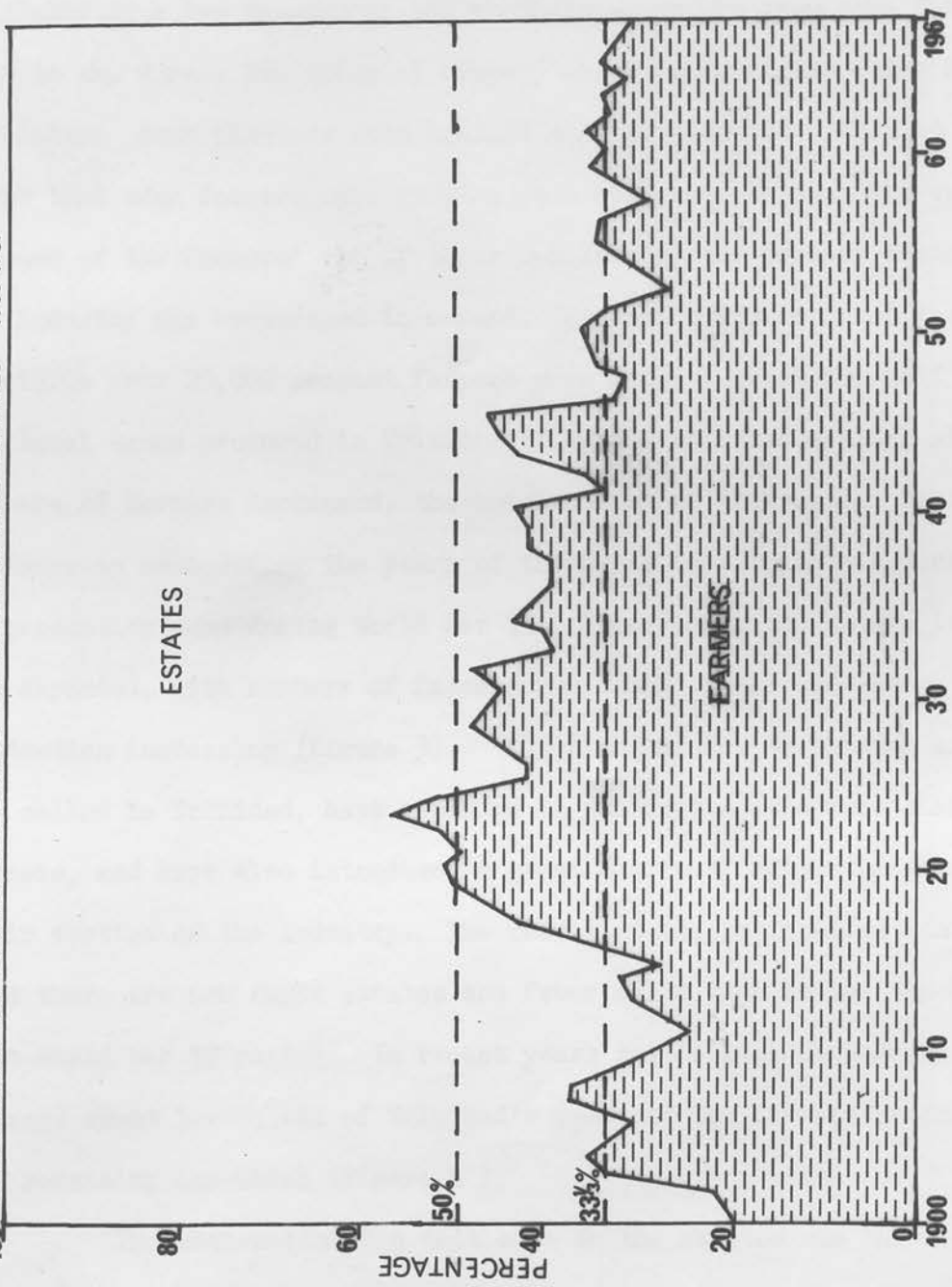


Fig. 2

Until the 1880s, the Trinidad sugar industry consisted essentially of a plantation system in which sugar cane planters each owned milling facilities. From the depression that the sugar industry underwent in the last two decades of the 19th Century, developed the cane-farming or peasant sector of the industry. This sector consisted initially of a few farmers in the southern areas who grew cane for sale to the former New Colonial Company which operated the Usine Ste. Madeleine. Some planters were against this development. When it was found that cane farmers were growing cane more cheaply than the estates, because of the farmers' use of their own labour, the peasant sector of the industry was encouraged to expand. Expansion was so great that in the 1920s over 20,000 peasant farmers were growing about one-half of the total canes produced in Trinidad (figure 2). Subsequently, although numbers of farmers decreased, the total output of this sector continued to increase even during the years of the Great Depression. A decrease in production came during World War II. Since then, the entire industry has expanded, with numbers of farmers remaining stable and their production increasing (figure 3). The plantations, or estates as they are called in Trinidad, have expanded in production even more than the farmers, and have also introduced a great degree of rationalisation in their section of the industry. The result of the rationalisation is that there are now fewer estates and fewer mills than in the immediate post-World War II period. In recent years the estates have grown on average about two-thirds of Trinidad's cane and the farmers produce the remaining one-third (figure 2).

The rationalisation that came to the estates was the result of deliberate attempts by commercial firms to produce cane as economically as possible. No such attempts were made to improve the structure of the cane-farming sector, so that although farmers have decreased in number, there are still about 10,000 farmers who sell

TRINIDAD: Farmers' Production of Sugar Cane 1939 - 1967

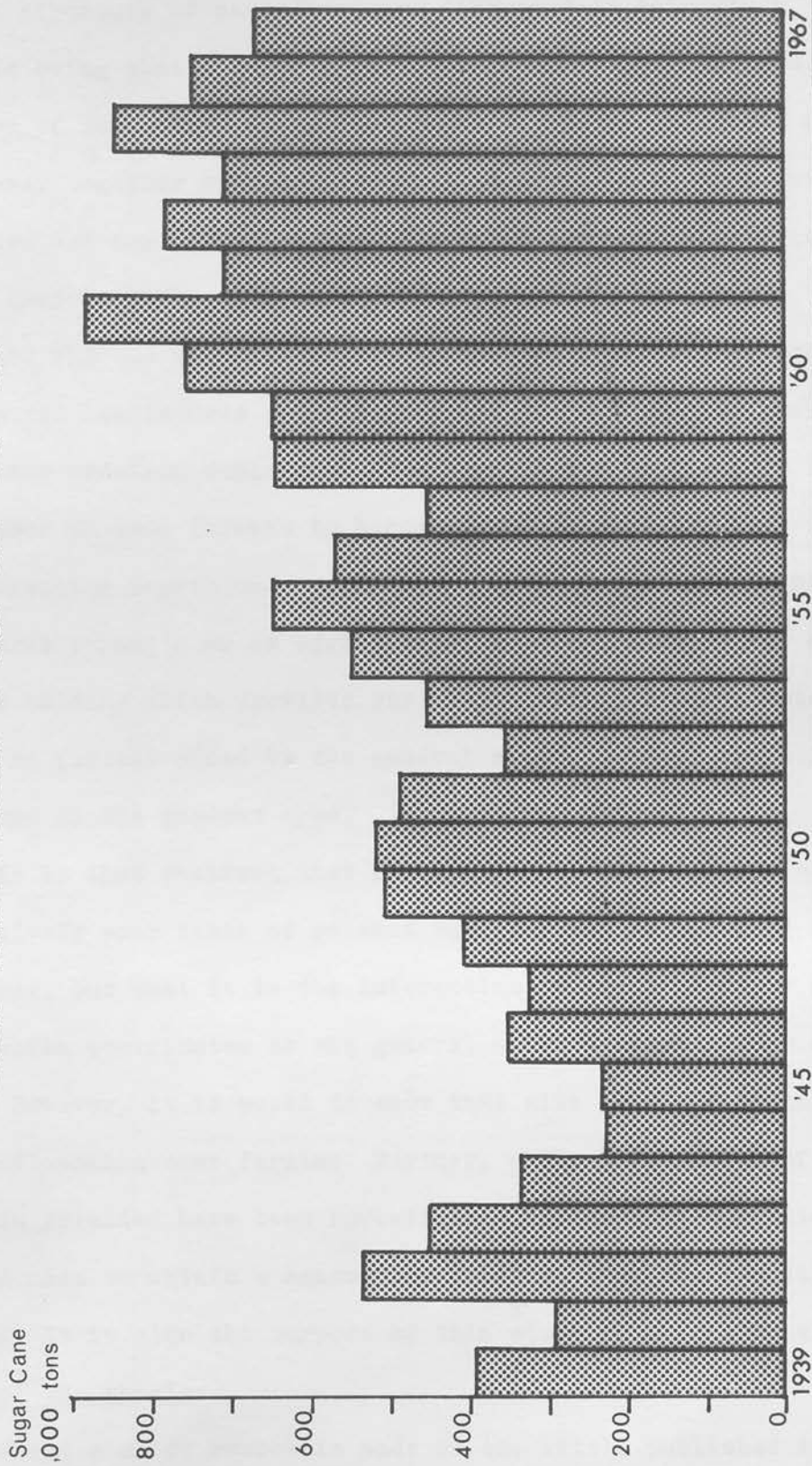


Fig. 3

canes to the estates. There is a preponderance of small producers with few of them farming viable holdings (table 1). The causes of this size structure of cane farms are discussed in this study, with the thesis being that size of farms is the main factor influencing production of sugar cane among cane farmers. The influence of size of holdings, together with all the limitations of a peasant form of agriculture and the lack of a suitable infrastructure to service the farmers' needs will be seen to result in generally poor land management. The low yields on farmers' holdings, the size of the farms and the low incomes derived from agriculture tend to push farmers into off-farm employment. The tendency, therefore, is for a large number of cane farmers to become non-full-time farmers, depending to an increasing degree on supplementary incomes from either non-agricultural pursuits or as agricultural workers. Indeed, for many it is the holding which provides the supplementary income. This tendency is further aided by the general attitude of contempt for agriculture of the peasant type.

It is thus realised that no single factor is responsible for the relatively poor state of peasant cane farming as compared to estate agriculture, but that it is the interaction of a multiplicity of factors which contributes to the general under-development of cane farming. However, it is hoped to show that size is the most important factor influencing cane farming. Further, while some facets of cane farming in Trinidad have been investigated in the past, no attempt has ever been made to obtain a macroscopic view of the cane-farming community. It is also the purpose of this study to fulfil this need.

Outline of the thesis

First a short review is made of the little published literature existing on the subject. This is followed by an account of the approach adopted in the study, the basis for selection of farmers interviewed and the type of information collected. Some aspects of the

Table 1: 1967 - Farmers' production of sugar cane by classes.

Classes of farmers	Number of farmers	Percentage of total number	Tonnage delivered	Percentage of total tonnage	Average tonnage per farmer
1 0 - 5 tons	625	6.33	3,275	0.48	5.24
2 6 - 20 "	2,421	24.53	32,444	4.79	13.40
3 21 - 50 "	3,039	30.79	103,257	15.24	33.98
4 51 - 100 "	1,943	19.69	138,636	20.46	71.35
5 101 - 500 "	1,766	17.89	323,491	47.73	183.18
6 501 - 1,000 "	59	0.60	37,417	5.52	634.19
7 over 1,000 "	17	0.17	39,191	5.78	2,305.35
Totals	9,870	100.00	677,711	100.00	68.66

Source: Sugar Manufacturers' Association, Trinidad.

operation of the survey are also discussed here, but other aspects are dealt with in the main study and the more technical facets in two appendices. Next some indication is given of the importance of agriculture and especially sugar cane in the Trinidad economy.

The rest of the thesis is divided into two parts, the first providing a general background to the sugar cane industry in Trinidad and the second, a more detailed assessment of the cane-farming sector. In Part I, there are three chapters, the first of which is a brief survey of the historical development of the industry. The second chapter deals with the structure and organisation of the whole sugar industry. The last chapter in Part I is a discussion of the land-use characteristics of the sugar cane growing areas of Trinidad. It is hoped that Part I of the thesis would provide sufficient background against which the cane-farming sector of the industry can be viewed.

The second part of the thesis consists of five chapters for which almost all the data are derived from a questionnaire survey that was carried out among cane farmers. The first of these chapters deals with the factors of production as far as the data permit. The second discusses the agricultural production of peasant farmers and the third, the services and infrastructure provided for the cane-farming community. The fourth chapter in Part II is an attempt to use the multivariate statistical technique of factor analysis to determine the major factors affecting sugar cane production among peasant cultivators. Finally, the study is summarised and the general implications for the development of cane-farming discussed.

Review of the literature

Although cane farming is possibly the best documented form of peasant agriculture in Trinidad, little published material exists on the subject. The published literature relating to cane farming is restricted to four types. There are reports of several commissions of inquiry; a survey report presented to the Legislative Council of

Trinidad in 1933, also called the Gilbert Report; some case studies of Trinidad peasant agriculture published in the Journal, Tropical Agriculture, and lastly, the journal and records of the Cane Farmers' Association. Some interesting information exists in unpublished form, mainly in Government files and reports and the records of the sugar companies.

The first commission to mention peasant cane farming in its report was the West India Royal Commission of 1897.³ Its recommendations were piously repeated by two other commissions in 1930⁴ and 1945.^{5,6} These commissions all recommended the settlement of a peasantry on the land and the great need for extensive rehabilitation and development of existing farming communities, not only in Trinidad, but also in the rest of the Caribbean. Very little action was taken to ameliorate conditions of peasant farmers, in spite of the poor plight revealed by these commissions. The situation existing at the time each of these commissions was set up is described in the next chapter on the history of the sugar industry.

Since 1940, three special commissions have investigated various aspects of the Trinidad sugar industry. The first of these was the Benham Committee which recommended that subsidies be paid to both farmers and estates for planting sugar cane. The industry was

3. Report of the West India Royal Commission, 1897, Cmd.8655, HMSO.
4. Report of the West Indian Sugar Commission, 1930, Cmd.3517; HMSO.
5. Report of the West India Royal Commission, 1945, Cmd.6607, HMSO.
6. Report on agriculture, fisheries, forestry and veterinary matters, Professor F.L.Engledow, Cmd.6608, HMSO.
7. Benham Committee Report, Council Paper No. 1 of 1944, Trinidad.

facing serious labour shortages during World War II. A few years
 8
 later, in 1948, the Soulbury Commission was set up to investigate the
 entire sugar industry. Its recommendations, especially those relating
 to a subsidy for the use of lime, the price paid for burnt canes
 belonging to farmers, the conditions of roads and traces and the use
 of the rehabilitation fund of the industry, have not been implemented.
 9
 In 1959, another commission, called the MacKenzie Commission, was set
 up to investigate the cane-farming sector of the industry. The one
 important feature in all the evidence submitted to these commissions
 is that whereas the estates were able to submit documentary evidence,
 the investigations on the farming sector depended on data supplied by
 the estates and, generally, from impressions of cane farmers and other
 interested individuals, such as politicians representing constituencies
 in the sugar belt.

A report presented to the Legislative Council of Trinidad in
 1933 that was based on material collected from a survey carried out
 10
 among cane farmers is the Gilbert Report of 1933. This report was
 concerned solely with cane farmers in the southern area of the
 Naparimas and in the Caparo Valley. A large number of farmers were
 interviewed and much useful information was collected. The major
 recommendation of the survey report was that "the least efficient
 producers be dispensed with".¹¹ The report concluded that such

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8. Report of the Commission appointed to enquire into the working of the sugar industry in Trinidad, or the Soulbury Commission Report, 1948, Government Printing Office, Port-of-Spain, Trinidad.
 9. Report of the Commission of enquiry into the cane farming industry of Trinidad, or the MacKenzie Commission Report, 1960.
 10. Gilbert Committee Report as Council Papers Nos. 84 and 135 of 1933.
 11. Ibid. No. 84., p.46.

producers were generally those who sold less than 50 tons of cane. The report also suggested that the farmers who should be encouraged were those who were tenants and workers on an estate because "it would be unwise in connection with labour requirements of the estate to dispossess them"¹² Thus the interests of the estates were basic to the recommendations. Gilbert also recommended that it was worth encouraging those holders who farmed five acres of cropland, with sugar cane, livestock and food crops. He was, therefore, suggesting the encouragement of a system of mixed farming. Gilbert stated further in his report that "it seems desirable that a definite ratio of estates' cane to farmers' cane should be fixed for each estate for a period of years so that a farmer may have a feeling of security that is so essential to good work".¹³ Gilbert listed some of the prerequisites for development of peasant agriculture. These included the improvement of agricultural practices, a system of collective marketing, the use of better plant varieties and chemical fertilisers and the provision of adequate advice to farmers.

A series of intensive case studies of a small number of farmers, including non-cane farmers, was carried out during the period 1943-54. Three of these case studies were on areas where sugar cane is grown. Studies of peasant farming in the Bejucal¹⁴ and Oropouche

12. Ibid. No. 84., p.48.

13. Ibid. No. 135., p.22.

14. Jolly, A.L., "Peasant farming in the Bejucal area of Trinidad", Tropical Agriculture, Vol. XXII, No. 5, 1945, pp.83-88.

Lagoon areas by A.L. Jolly, and on the Las Lomas area by C.C. Parisinos, C.Y. Shephard and A.L. Jolly described the activities of some cane farmers. These surveys pointed to the general problems affecting peasant farming, and one, the Las Lomas area survey, recorded the serious loss of time incurred by farmers during sugar cane harvests because of overcrowding at the scales where farmers' canes are purchased. These surveys made no specific recommendations, but rather discussed problems. At about the same time, A.L. Jolly set up a pilot cane farm on which he showed that with a relatively small acreage, a peasant and his family could obtain a reasonable income.¹⁷ Its success was partly due to the intensive nature of supervision provided, and subsequently little else was done to transmit the management techniques used in the pilot project to the cane-farming population.

The last major documentary sources on cane farmers in Trinidad are the journal¹⁸ and annual reports of T.I.C.F.A. While providing detailed reports of an administrative nature, the organisation, through its journal, provides the main avenue for farmers problems to be voiced. Generally, farmers' points of view are portrayed.

In general, the total published literature, is small, though in various ways the studies have covered different facets of cane farming. The most thorough study was the Gilbert survey, but this was undertaken

15. Jolly, "Peasant farming in two districts of the Oropouche Lagoon, June, 1944-45", Tropical Agriculture, Vol. XXV, Nos. 1-12, 1948, pp. 23-32.
16. Parisinos, C.C., Shephard, C.Y., Jolly, A.L., "An economic survey of the Las Lomas district of Trinidad", Tropical Agriculture, Vol. XX1, No. 5, 1944, pp. 84-99.
17. Jolly, "Report on peasant experimental farms at the Imperial College of Tropical Agriculture", British West Indies Economic Series Memoir, No. 2., I.C.T.A., 1954.
18. The Cane Farmer is the journal of TICFA.

at a time of severe depression over three decades ago. Since that time, the number of farmers has decreased to less than two-thirds the total in 1933, and conditions have changed, but no study has been done to take note of the results of subsequent developments.

Methodology.

The study could have been undertaken in an intensive way, but this would have restricted its geographical content. It was thus decided to carry out a survey involving accepted sampling techniques and covering a large number of farmers. This meant that little time could be spent on each interview, which limited the type and scope of the information that could have been collected. The result is a general assessment of the existing situation which helps to bring into focus underlying patterns. Although this type of survey cannot provide an entirely adequate basis for detailed recommendations, it is hoped that the major problems will be discerned and, that those facets of cane farming that demand further investigation, will become evident.

The questionnaire inquiry is supported by a land use survey of the areas in which sugar cane is grown. From this survey a land use map was produced, which is intended to portray synoptically the juxtaposition of estates and cane farmers, to help to illustrate some of the constraints of peasant farming as obtained in the Trinidad sugar belt, and to show how these are depicted on the landscape. The land-use map is intended as an adjunct to the questionnaire survey, and reference is made to it mainly in its relevance to cane farming and not for land use per se.

Selection of farmers

The only criterion used in defining cane farmers was the official definition of a cane farmer as "a person who cultivates or contracts with a cultivator to cultivate cane for sale to a points at which farmers delivered canes, samples were taken for each

manufacturer, but does not include a manufacturer who cultivates canes on his own lands.¹⁹ A defined population was then available and the names of all such people were obtained from the manufacturers and the Cane Farmers' Association. The farmers were then stratified according to tonnages of cane sold. It was thought desirable to obtain such tonnages on the basis of a five-year average, but this was not done because individual figures for all farmers from all estates were not available for the five-year period ending in 1967. For one estate, figures were obtainable for only one year, 1967. As the latest figures available for all the farmers were for production in 1967, the figures for that year were used as a basis for stratification and selection of the sample. A comparison is made between production for 1967 and for other recent years at the beginning of part II.

The stratification used for delimiting the classes of farmers is that used in official publications of the industry. This stratification was adhered to for purposes of comparison and is shown together with the size of the sample as follows:-

Table 2: Stratification and size of sample

		Total farmers 1967	Sample size	Sampling fraction
Class 1	0 - 5 Tons	625	48	7.7%
Class 2	6 - 20 "	2,421	121	5.0%
Class 3	21- 50 "	3,039	194	6.4%
Class 4	51- 100 "	1,943	139	7.2%
Class 5	101- 500 "	1,766	203	11.5%
Class 6	501- 1,000"	59	33	55.9%
Class 7	Over 1,000 "	17	11	64.7%

After the strata were further divided according to the buying points at which farmers delivered canes, samples were taken for each

19. Production of Cane Ordinance, Chapter 23, No. 12 of 1946.

category at the buying points. These buying points are also called scales, outside stations or purchasing points. All the buying points for the two smaller estates, Trinidad Sugar Estates (TSE) and Forres Park Limited, are combined and regarded only as two separate points located at the respective mills. A few scales belonging to Caroni Limited, which are located close to each other and used by the same group of farmers during a harvest, are combined on some maps. All other buying points for Caroni Limited are shown separately. Tables of random numbers were used to choose the farmers to be interviewed at each point. A random stratified sample was obtained according to buying points, thus giving a satisfactory distribution for some geographical interpretation. However, as the sample at each point is relatively small, it cannot be used according to buying points in analysing the data (figure 33). The entire sample is discussed according to classes of farmers, and only where other relevant evidence supports a distribution are the buying points used to portray the data. An attempt was made to divide the data areally into a few large sections, but it was found that no worthwhile purpose was served, and it appeared that divisions were being made areally only for the sake of doing so. In the final chapter on the questionnaire all the survey data is pooled, and the statistical technique of factor analysis is used to interpret the material.

A total of 789 interviews were completed, but 40 of the completed questionnaires were rejected because of serious inconsistencies. Thus 749 farmers, or about $7\frac{1}{2}\%$, of the cane-farming population are included in the survey. Most of this work was done between February and July, 1968, with interviews being done either at farmers' homes, on their holdings or at the purchasing points. Most

interviews were completed in one visit, but some required as many as five sessions. Interviews varied in length from 45 minutes to three hours.

The Questionnaire

The information collected covers most facets of cane farming. Data on actual money incomes and expenditure were not collected because it was feared that this would cause farmers to give false answers, not only to these questions, but also to the rest of the questionnaire. Moreover, as most farmers do not keep records, it would be difficult to obtain reliable information on incomes and expenditures. Information collected relates mainly to 1967, and includes data on the farmer, his household, the holding, cultivation practices, acreages under different crops, time spent on and off the farm, paid and unpaid labour employed, livestock, credit, advisory services, transportation and social activities and attitudes. In some cases cross-questions were deliberately included in order to check on the consistency of replies (see Appendix I and the questionnaire).

At the beginning, a draft questionnaire was produced and a pilot survey of ten farmers was completed. After the pilot survey was completed and the questionnaire was discussed with several individuals and organisations in the industry, a few changes were made on the questionnaire before the main survey was begun. Difficulty was experienced at first in persuading farmers to respond to questions, in spite of farmers being given the assurance that the information would be treated as confidential. However, field officers of the sugar estates and the Cane Farmers' Association assisted immensely in persuading farmers to be co-operative. Generally, the response rate was high, for 90% of those farmers approached answered questionnaires

that are used in the analysis.

The accuracy and validity of the data are discussed at the beginning of Part II.

Agriculture in the Trinidad economy

Since its discovery in Trinidad in the early decades of this century, oil has overshadowed agriculture in the economy. Judged by reference to agriculture's contribution to the Gross Domestic Product and to export earnings, agriculture appears to assume a minor role which has been declining even further in recent years (figure 4). Its contribution to the Gross Domestic Product at factor cost is now just over 8% and to export earnings about 14%, while the equivalent figures for petroleum and petroleum products are 25% and 80% respectively. The major agricultural products are sugar, cocoa, coffee and citrus, which form the basis of export agriculture (see Appendix III, table 1). There is another branch of agriculture producing crops mainly for the local market and which is termed domestic agriculture. Cane farmers contribute to both export and domestic agriculture, for they grow food crops as well as sugar cane.

The production of sugar cane is the principal agricultural activity occupying about 100,000 acres of land, about three-fifths cultivated by the estates and the rest by cane farmers. Sugar also contributes one-quarter of agriculture's share of the Gross Domestic Product, 9% of the value of total net exports, and employs over 24,000 workers, including cane farmers and estate employees. Under-employment is a feature of the industry during the non-harvest period. The major recent developments have been factory expansion, the building of bulk-loading facilities at Point Lisas, and the introduction of completely mechanised harvesting on part of its holding by the largest estate.

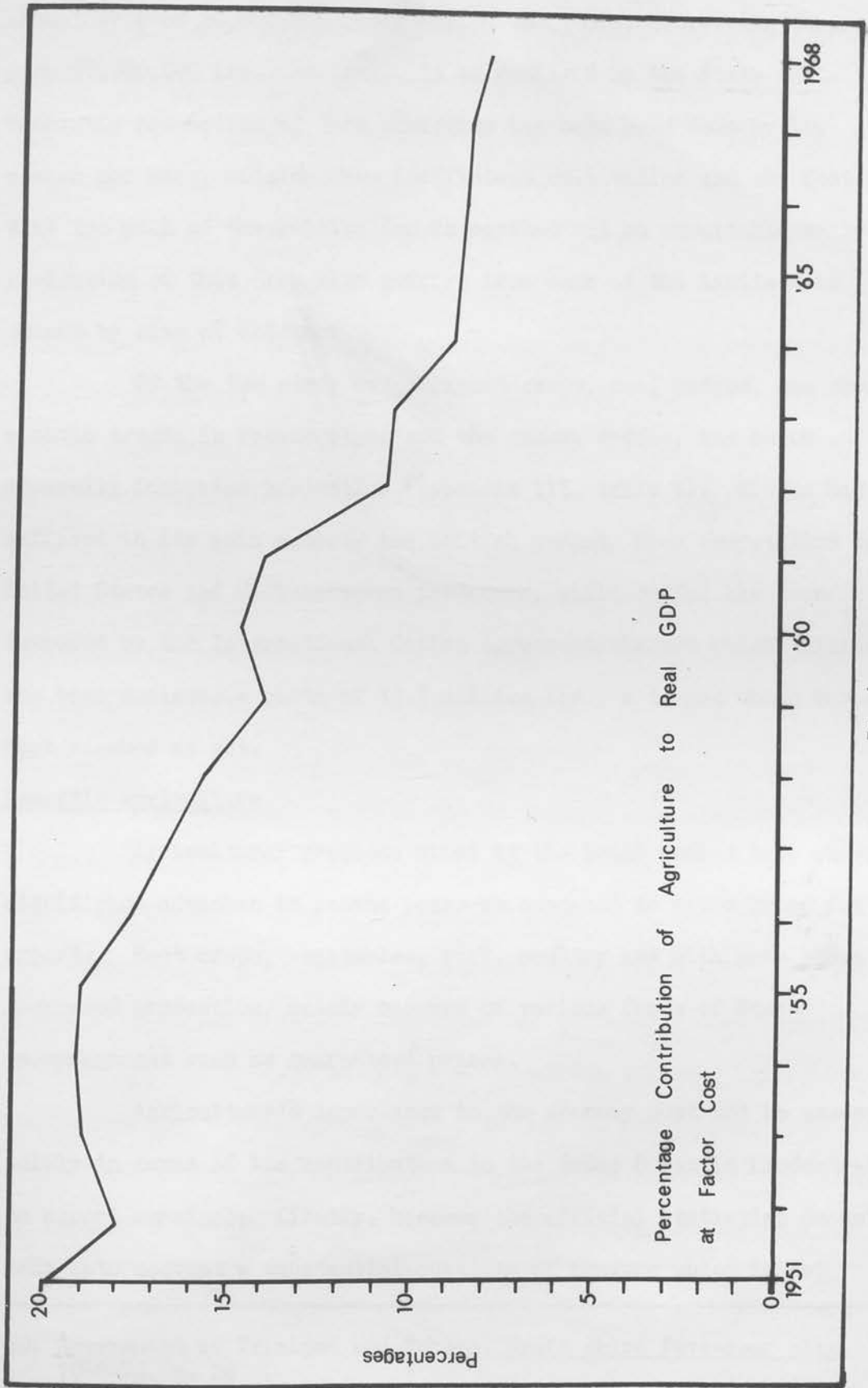


Fig. 4

Cocoa, cultivated mainly in the areas east and south of the cane belt, has shown a downward trend in production with an average annual crop of 20,000,000 lbs., during the 1950s, decreasing to just over 10,000,000 lbs., in 1967. It is realised by the State that "domestic production of this commodity has been held down by low yields per acre, arising from inefficient cultivation and the fact that too much of the cultivation is carried out on unsuitable soils." 20 Production of this crop also suffers from some of the limitations caused by size of holdings.

Of the two other major export crops, one, citrus, has shown erratic trends in recent years and the other, coffee, has shown generally increased production (Appendix III, table 1). Citrus has suffered in its main outlet, the British market, from competition by United States and Mediterranean producers, while coffee has been favoured by the International Coffee Agreement through which Trinidad has been assigned a quota of 13.2 million lbs., a target which has not been reached as yet.

Domestic agriculture

Agricultural products aimed at the local market have shown significant advances in recent years as compared to crops grown for export. Root crops, vegetables, pork, poultry and milk have shown increased production, mainly because of various forms of State encouragement such as guaranteed prices.

Agriculture's importance to the economy must not be assessed solely in terms of its contribution to the Gross Domestic Product and to export earnings; firstly, because the official statistics do not take into account a substantial quantity of produce which is not

20. Government of Trinidad and Tobago, Draft third five-year plan, 1969-73, p. 28

exchanged against money and is not valued for national income purpose; and secondly, agriculture and allied occupations such as forestry, fishing and hunting, employ about 22% of the labour force of 305,000 workers.²¹ With unemployment existing at an acknowledged rate of about 14%²², a labour intensive agriculture is of great importance in providing employment opportunities. However, productivity and incomes are low in agriculture as compared to other sectors of the economy, and if agriculture is to become attractive, investment, incomes must rise. Yet, agriculture plays an important social part in spite of low incomes. Lastly, the role of agriculture is also that of food production. Trinidad, in common with most other Caribbean territories, has traditionally imported a considerable amount of its food supplies, because the economy has been export oriented. The production of food crops for the local market would help lower the present dependence on imported foodstuffs, help the balance of payments and save foreign exchange.

Agricultural policy and relevance of the study

The basic objective of the government's agricultural policy is "to modernise and diversify the agricultural sector, in order to reduce the country's dependence on traditional export crops and to provide a greater proportion of its food requirements from domestic sources."²³ In its plan the government further states that there is no real conflict between the goals of promoting domestic agriculture and encouraging export agriculture. The aim in planning for agriculture within this framework, it states "is to attempt by means of a rational and co-ordinated approach effectively to diagnose the

21. Ibid., p.26.

22. Ibid., p. 21.

23. Ibid., p. 239.

constraints to development, and to remove the impediments to structural change and expansion in this vital sector of the nation's economy."²⁴

Because one of the aims of this thesis is to ascertain some of the constraints which inhibit the development of cane farming, the most important form of peasant production in Trinidad, its relevance to contemporary Trinidad agriculture is evident.

PART I

24. Ibid.

CHAPTER 1A STUDY IN RETROSPECT

Present-day agriculture and land use in Trinidad are unintelligible without an appreciation of the historical events which have influenced the development of the island since its discovery by Columbus in 1498. One must examine the consequences of the colonial policies of the metropolitan countries which controlled the affairs of the island and determined its mode of development. The Spanish obsession for precious minerals, the decimation of the indigenous Amerindian population, the introduction of French settlers with their slaves and their embarkation on commercial sugar cane production, marked the period of Spanish rule. The island passed into British hands in 1797. Britain was faced simultaneously with an intractable labour problem in the colony and the PART I abolitionist movement at home. The labour shortages became worse after the abolition of the Slave Trade in 1807, and even more acute after Emancipation and the end of the Apprenticeship system in 1838. The labour shortages led to the introduction of indentured immigrants from several sources, but mainly from India. The consequent development of plantation agriculture, and later the growing of sugar cane by ex-slaves and their descendants and by ex-indentured labourers, marked the entry of the Trinidad sugar industry into the modern age by the end of the nineteenth century. The present century has also brought its experience of anxiety, but after some rationalisation the industry expanded considerably in the period following the Second World War (figure 5). This expansion has taken place under the protection offered by the Commonwealth Sugar Agreement signed in 1951. All these developments have helped to shape the present-day sugar

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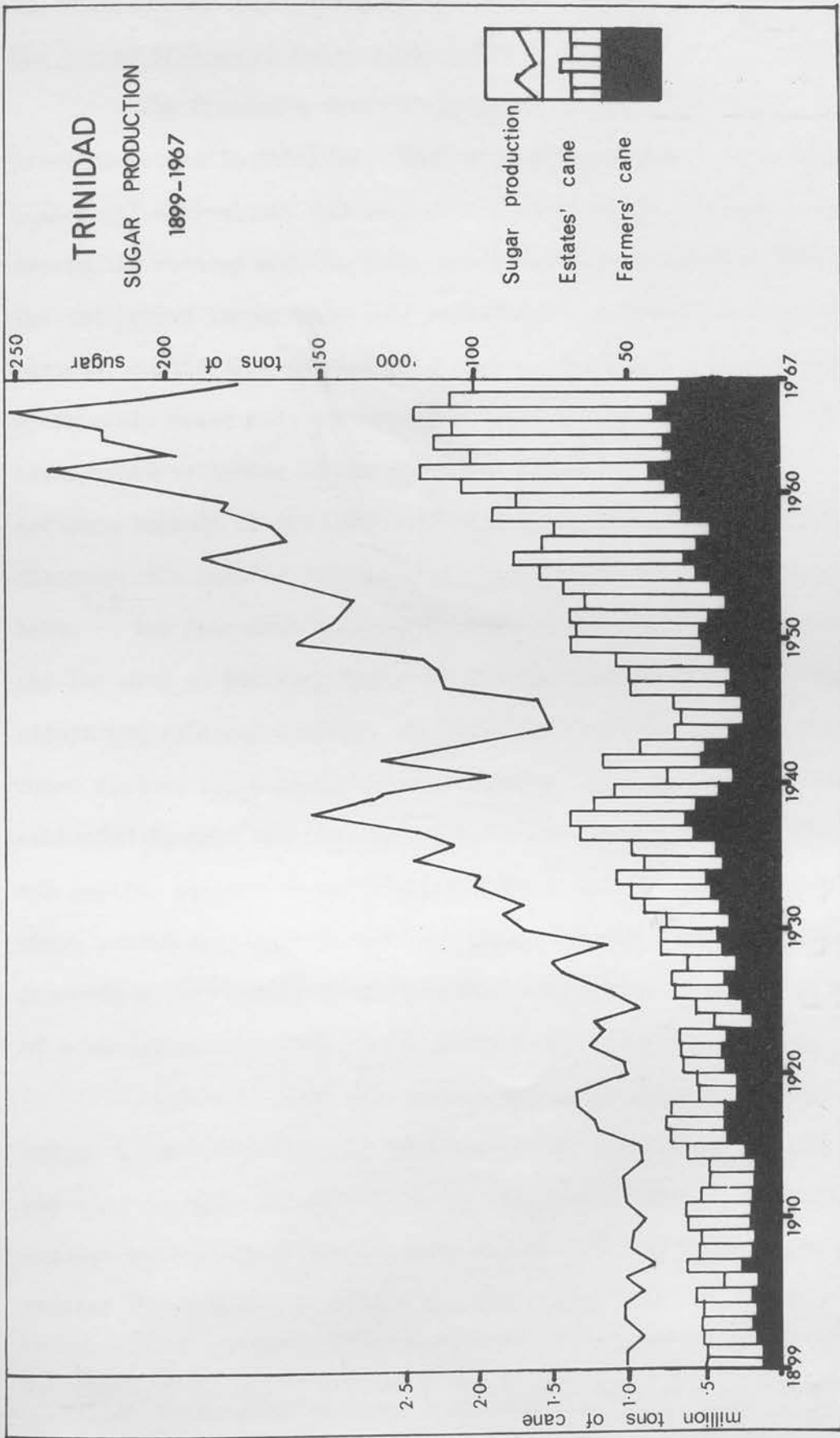


Fig. 5

industry of Trinidad, and must be considered in any attempt to explain the contemporary sugar scene of the island. The period of Spanish Rule, 1498--1797.

The Spaniards were disappointed by their failure to discover precious metals in Trinidad. They made little attempt to establish commercial agriculture and succeeded conversely in destroying the Amerindian economy and, in turn, the Amerindian population itself. The indigenous inhabitants were collectors and subsistence agriculturists, cultivating patches of ground on the higher river terraces. By forcibly being made to work in an unaccustomed way, by being transported to labour in the mines on the Spanish Main and the northern islands of the Caribbean, and by succumbing to introduced diseases, the natives dwindled, so that by 1797 there were only 1,082^{1,2} left. The Spaniards undoubtedly were pre-occupied on the mainland, and for most of its stay under the Spanish flag, Trinidad had an almost non-existent economy. Besides the quest for gold, there were other factors which precluded development. High excise duties were collected in kind upon the arrival of sugar in Spain, while Spain's own earlier version of the Navigation Laws placed trade restrictions which forced producers to send all their exports first to Seville. In addition, the restrictions upon the importation of slaves by means of a lucrative licensing system further inhibited development.

Although cacao was planted in the Amerindian intermixture of crops, it was not until 1686 that commercial cultivation of this crop was begun by Capuchin Fathers using Amerindian labour. Tobacco was another indication of development, and in 1701 the first Negro slaves entered the island. Cacao was increasing until collapse

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1. Bowen, N.P. and Montserin, B.G., Trinidad and Tobago Census Album, 1946, Government Printery, Port-of-Spain, 1948, p.12.
 2. No accurate figures are available for the original native population.

came in the form of a 'blast'³ in the late 1720s which destroyed the crop. Later the more hardy forastero variety of cacao was brought from Brazil, and after 1756 this was the variety generally cultivated.

So far the history had been one of maladministration with all its attendant evils. This continued until the latter half of the eighteenth century when French settlement produced changes. Up to the time of French settlement, however, development had been at best sporadic and unharmonious. In describing the period under Spanish rule, E.E. Williams says, "this, until 1777, was Trinidad under Spanish Colonialism - poor, undeveloped, a showpiece of metropolitan incompetence and indifference".⁴

In the last two decades of Spanish rule came a period of activity to change the dismal scene. It was at this time that the history of commercial sugar cane began in Trinidad.⁵ In 1781 a Cedula⁶ by the Spanish intendant at Caracas, into whose province Trinidad has passed in 1742, and amplified by a more famous Cedula issued in Madrid in 1783, invited settlers to Trinidad. The proposals were to permit mainly the settlement of French planters in the island. In a few years, the coincidence of the French Revolution with this scheme to relieve Trinidad's labour shortage, helped considerably in securing settlers from French Caribbean territories.

The new settlers had been raised in sugar economies, and it was to this crop, rather than to the island's main crop, cacao, that they turned. This change from a tree crop to a field crop created the

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3. This 'blast' was either a hurricane, or more probably the effect of a plant disease, 'Phytophthora palmivora'.
 4. Williams, E. History of the People of Trinidad and Tobago, Andre Deutsch, London, 1964, pp.27-28.
 5. The date of introduction of sugar cane to Trinidad is not recorded, but might have been in the early eighteenth century.
 6. A Cedula was a decree, proclamation or order issued by the Spanish Government.

need for more labour, and although the French settlers had brought slaves with them⁷ the labour shortage was further aggravated. Nevertheless, by the time British occupation came in 1797, the French had made considerable progress in agriculture, and sugar cane was pushing cacao into the valleys of the Northern Range and further eastwards.

Sugar cane, first grown in the environs of Port-of-Spain, spread along the western shores of the island, along the Gulf of Paria. This western lowland area it still occupies today. The usines, or grinding mills, were situated along the Paria coast, but some were also in the Mayaro-Moruga area. Excessive rainfall and inaccessibility resulted in the abandonment of the latter area in the early nineteenth century. The importance of these developments was not only that they/virtually demarcated the areas of the present-day industry, but also that within a short period of two decades, Trinidad's economy depended mainly on sugar. Its fortunes were then bound up with those of the older sugar islands. As such it was to feature, like the other colonies, in European trade, politics and rivalry, and the extension of the slave system, the pre-requisite of development. It was Trinidad's involvement in European bickerings that resulted in its bloodless seizure by the British in 1797. Spain was now not only indifferent, but also weak.

The foundations of the present sugar industry were laid, then, in the last years of Spanish rule. The area of location, first around Port-of-Spain, later spread to most parts of its present-day area. The development of the industry had to combat the most intractable problem during the period of British occupance, the problem of perennial labour shortages. In the last two decades of Spanish rule there were

7. Although statistics are not available, Borde, P.G.L. gives a figure of 300 slaves for 1782 and 10,100 in 1789, Borde, P.G.L., Histoire de l'Île de la Trinité, Maissonneuve, Paris, 1883, p.277.

two major improvements, made through the initiative of the last Spanish Governor of the island, Don Jose Maria y Chacon. He reorganised the administration of the country, reformed the laws relating to tenure and land grants. "This proclamation of Chacon in 1785", says Williams, "represented one of the most decisive and constructive efforts ever made in the West Indies to deal with the problem of latifundia or plantations which had throughout the seventeenth and eighteenth centuries impeded the full development of other colonies..."⁸ The proclamation was based on the principle that planters would have a right only to lands which they were capable of cultivating. Chacon also drew up a Cedula, the Code Noir of 1789, for the protection of slaves.

The period of British Rule up to 1838

In 1797, at the beginning of British rule, the population was about 18,000⁹, composed of the following:

Whites	Free Coloured	Amerindian	Slaves
2,086	4,466	1,082	10,009

Most landowners were Europeans and numbered about 280 proprietors.¹⁰

The situation was, at that time, unique in the West Indies in that absentee landlordism was unknown. Of the 468 estates owned by the proprietors, 159 grew mainly sugar cane (table 3), producing 7,800 hogsheads¹¹ of sugar.¹² With few exceptions though, estates were small

8. Williams, op.cit., p.45.

9. Bowen and Montserin, op.cit., p.15.

10. Borde, op.cit., p.277.

11. A hogshead was a measure of 14-18 cwt.

12. Borde, op.cit., p.277.

Table 3: Sugar Estates and Sugar Companies 1797-1967.

Estates (mainly individuals)		Estates (mainly companies)	
1797	159	1900	21
1801	192	1905	17
1807	214	1910	14
1840	180	1930	10
1865	154	1940	9
1887	90	1950	6
1896	56	1960	5
1897	39	1967	3

Source: Sammy, R.V.A. The development of commercial sugar cane agriculture in Trinidad, M.A. Thesis, Univ. of Alberta, 1967, p.137.

and with few slaves, but the development achieved in the two previous decades was remarkable.

The expansion of agriculture could not proceed as quickly in the following years. In Britain, the principle had been accepted that the slave trade should be abolished. Furthermore, the fight against slavery itself was on. Planters in the older colonies of the north suddenly became protagonists of one of the aims of the Abolitionists, that slaves should not be sent to new territories, fearing expansion of the system. West Indian planters were quick to suggest that slaves should not be sent to Trinidad and their other new rival, British Guiana. They feared that with virgin soils and an influx of slave labour to these two territories, competition would become too great. For these reasons it was difficult for Britain to permit any mass movement of Negro slaves to Trinidad. Scarcity of labour which had faced the Spaniards was again a major problem.

The fear of the Abolitionists that the acquisition of Trinidad would mean an extension of the system of slave labour was borne out

13. London, 1850, p.17.
14. Trinidad, CO. 295/34, February, 1814.

immediately. Between 1797 and 1802 the slave population doubled to almost 20,000.¹³ Thereafter, the rate of entry dropped. The abolition of the slave trade by Act of Parliament in 1806 effectively restricted the purchase of slaves from other West Indian islands, as well as cutting off the supply from Africa. However, the purchase of slaves from other islands was very expensive and only a few estates could have afforded it. The planters in the other islands also realised that they had labour supplies which, if sold, could not be replaced. The alternatives were the immigration of free labour and, on ~~some~~ occasions, the settlement of Negroes who had been freed from slavers still engaged in the trade. In 1806, 192 Chinese were brought in, but a lack of Chinese women discouraged permanent settlement. Most returned to China and those that remained went into occupations other than agriculture. In 1815-16, a number of free, coloured ex-slaves from southern United States were settled as a reward for help to British soldiers in the war of 1812.¹⁴ Most of these settled in the towns, and so the agricultural labour force did not grow. There was also sporadic and unsuccessful settlement of disbanded soldiers and refugee planters from Grenada and Dominica. In the meantime, slaves were being smuggled in at the rate of 2,000 a year.¹⁵ Further restrictions on slaving activities continued and in 1824 the remnants of legal sanction disappeared. Moreover, the new obligations as regards housing, health, food and working hours made slavery more expensive. Manumission became easier and female children were manumitted compulsorily. There was thus going to be a steady reduction in the slave labour force, matched by a growth in the numbers of free coloured, who had no obligation to remain on the estates.

13. Deerr, N. The history of sugar, Chapman & Hall, London, 1950, p.279.

14. De Verteuil, L.A.A., cited in Harvey, D.R. Economic aspects of the historical geography of Trinidad, M.Sc.Econ. Thesis, Univ. of London, 1955, p.17.

15. Trinidad, CO. 295/34, February, 1814.

Emancipation of slaves came in 1834, but the full effects were delayed by a system of compulsory apprenticeship for a period of four years. By this Act the planters, and not the slaves who had suffered, were paid a compensation for their loss of property. Compared to the other West Indian territories, Trinidad had few slaves who were thus more valuable. The average claims for compensation in Trinidad was for seven slaves, valued at about £50 per slave, compared to 23 in British Guiana, 24 in Tobago, 21 in Antigua, 20 in St. Vincent, and 15 in Jamaica.¹⁶ Some of these slaves were domestic and not field workers. The total slave population at Emancipation was only 17,539.¹⁷ The presence of so few slaves showed that Trinidad was not as yet a plantation society. It was a society of small planters. The lack of labour, the relative size of the island compared to its slave population, the productive capability of its still only slightly-used soils, and the fact that many of the ex-slaves were unwilling to work on the terms and conditions set down by their malefactors on the sugar estates, led to the development of the next phase in the history of the island, the introduction of indentured workers.

Many of the 17,000 emancipated slaves began to squat on Crown Lands which were readily available all over the island. These labourers were forced to squat rather than buy lands because they were effectively barred from purchase by that fact that Crown Lands could only be disposed of in parcels of 320 acres and over.¹⁸ Thus the ex-slaves were prevented from becoming a class of small land-owners. Those who did not squat on Crown Lands turned to the trades

16. Williams, op.cit., p.84.

17. Deerr, op.cit., Vol.11., p.306.

18. Williams, op.cit., p.85.

that were open to them forming later the bulk of the artisan class. Some went to work on cacao estates where conditions were better. But the planters still needed labour, and because they had been paid compensation, and were able to repay their debts, could offer relatively high wages to attract workers. In spite of this, however, the labour shortages continued, awaiting solution by some other means.

The tasks of the planters were then to try and retain some of the ex-slaves on the estates by persuasion, to transform them into a dependable work force under new circumstances, and finally to augment the labour supplies either as replacement or for expansion. When wage rates were raised to attract workers, the planters for a time could afford this. However, in the 1840s changes took place in Europe, which led to the reduction of preferential duties on British West Indian sugar, and prices fell. Consequently, wage rates followed suit, and another reason for the movement of labour away from the sugar estates was provided. Thus slavery had ended and left its aftermath. It could be seen that it had a short history, which, possibly only because of its brevity, did not bring the tragedies that had taken place in the older sugar islands. The places of the slaves and then the ex-slaves on the sugar estates were to be taken by a new immigrant in another - and this time more successful - attempt to solve the problem of labour shortages that had plagued the island up to then.

The period of indentured labour

The magnitude of the labour problem in the 1840s was colossal. But in spite of all the pointers to the situation, the planters were not prepared to face the changes. In Trinidad, labour was scarce. The Planters were employing labourers of low productivity for higher wages than obtained in the other islands. Planters went back in debt,

sold estates in parts or abandoned some altogether, and by 1849 nearly all were heavily mortgaged.¹⁹ Cheap labour was the one remedy that could save the planters. This was now their main pre-occupation.

Although several attempts had been made to introduce new settlers to Trinidad, it was not until the post-emancipation labour problems that the most concerted effort was made to attract labour. India became the main source of indentured labour. At first the planning involved was either negligible or unenlightened. The immigrants were either not accustomed to agricultural work or unfamiliar with the food, implements and animals available. But the planters preferred to have cheap labour which they thought the next best thing to slavery, rather than improve through technological changes.

As a dependable labour supply was not forthcoming either from Africa, Europe or China, or from the other Caribbean territories where there was excess labour,²⁰ it was in 1844 that the British Government agreed to the immediate movement of workers from India. During the course of this immigration between 1845 and 1917, 145,000 Indians went to Trinidad, and 238,000 to British Guiana. Lesser numbers were taken to the other territories, and in all nearly half a million Indians were brought into the area. One-third the cost of passages was met by public funds, so that this was subsidised labour for the planters.

Conditions of work for immigrants

Many rules were formulated during the period of immigration in order to regulate conditions of work for indentured labourers. These were consolidated by an Ordinance of 17th July, 1899, from which the following section was extracted. Although wages soon after emancipation were of the order of about 50/- per month, wages for immigrants from

19. See Beachey, R.W. The British West Indian Sugar Industry in the late nineteenth century, Basil Bladwell, Oxford, 1957, pp.1-39.

20. Williams, op.cit., pp.112-115.

India were set at about half this amount. The planters were now seeing that their problems could be solved if they could be provided with an adequate supply of such cheap labour. By the Ordinance of 1899, the legal wage for an able-bodied immigrant was set at not less than 25 cents B.W.I., or 1/0½d, or at about 30/- per month.

Various parts of the Ordinance governed the immigrants arrival, allotment to estates, dwelling, food, health, labour, wages, leave and desertion. Imprisonment and fines were to be applied for every slight misdemeanour. Williams describes the regulations as follows: "The grand discipline of slavery and the principal incentive to labour was the whip. The grand discipline of the system of indenture and the principal incentive to labour was the jail. Indentured labour was ... slavery plus a constable."²¹

Although many of the regulations were meant to favour the working and living conditions of the immigrant, in most cases such regulations were not enforced.²² Health and leave benefits also were not administered in the immigrants' favour. The labour force became a sick and inefficient one, using passive resistance whenever possible. The planters thus failed to obtain the objective of an efficient and willing work force. They rejected improvements both in field and factory for cheap labour. They were laying the foundations of the crisis which was to come from beet sugar competition in the late nineteenth century. Later this resulted in the fact that as peasant farmers the immigrants could produce sugar cane at a lower cost than the estates.

It must be noted that during the period of Indian immigration to the Caribbean, there was a movement of "an even larger wave of Negro emigration,"²³ to the Panama Canal, Costa Rica, the United States and

21. Williams, op.cit., p.105.

22. Personal communication with ex-indentured workers who are still alive.

23. Williams, op.cit., p.115.

Cuba, where working conditions and wages were better. There was thus, in the West Indies, sufficient labour, but it was not cheap enough.²⁴ Consequently, one must conclude that the system of indentures was carried on possibly because, in the opinion of the planters, these workers could be the more easily kept in a state of semi-servitude and at low wages. Furthermore, it was a system subsidised by public funds.

Why did Britain permit this system to be started? The Industrial Revolution permitted or possibly demanded that Britain should expand her trading links to countries outside her Empire. The Equalisation Acts, which were first passed in 1846, made more liberal in 1852, and culminated in the wider Free Trade policies of the 1870s, showed that Britain had revoked its policy of protection for colonial products on the British Market. The West Indian planters were faced with open foreign competition and they fought for protection. They argued that, up to that time, their competitors had been poor customers of British goods, that money had flowed from the West Indies to Britain, and that Britain owed a duty to maintain the economy of her oldest colonies. Free Trade policy continued, but West Indian interests had to be placated in some way. Cheap labour was the concession, partly financed by public funds. The planters did not seem to care about the inefficient use they were making of cheap labour, nor of the low productivity of the labour.²⁵

In spite of the circumstances in which the immigrants found themselves, they managed to achieve a considerable degree of

24. See also for Jamaica, Paget, E. "Land use and settlement in Jamaica," in Steel, R.W. and Fisher, C.A., Geographical essays on British tropical lands, George Philip & Son, London, 1956, p.209.

25. For a discussion of cheap labour policy see Myint, H., The economics of developing countries, Hutchinson, London, 1964, pp. 54-57.

independence after their periods of indentureship ended. Because of the problems facing Caribbean sugar, owing to Britain's Free Trade policy, and the simultaneous availability of bounty-fed beet sugar from Europe, sugar prices were low. At the end of indentureships, labourers were offered a chance to settle in Trinidad, or also to renew their indentureships on better terms. This was done in order to cut the costs of repatriation, which, in spite of being subsidised could not be met. This development meant that ex-indentured workers could not only obtain land, which the emancipated slave was effectively barred from doing, but also could later sell sugar cane to the estate-owned usines. Moreover, they would remain in the island to continue to form part of the agricultural labour pool and in addition not require a return passage.

The results of Indian immigration to Trinidad were that sugar cane was provided with a labour supply and hence was able to retain its importance; and wages were depressed, sowing the seeds of early discontent between immigrants and ex-slaves. While the planter had so far successfully fought the battle against peasant farmers, the fortunes of sugar forced him to capitulate and permit the ex-indentured workers to form a class of small farmers. But more important still was the eventual permanent settlement of the indentured workers, to form part of the island's social and economic systems.²⁶

Yet another development during this period was the transformation of the industry from one of relatively small owner-plantations at Emancipation to fewer, but larger estates, the true plantations, by the end of the nineteenth century (table 3). In the 1830s sugar exports were about 10,000 tons from over 200 estates, while in 1897, 54,000 tons

26. For a discussion of Indians in Trinidad see Williams, op.cit. - for Guyana, see Nath. Dwarka. Indians in British Guiana, Nelsons, London, 1950.

were exported from 39 estates.²⁷ This decline in the number of estates was in part a result of the problems of unprofitability ensuing from the lack of protected markets and, in part, due to the availability of labour to permit an extension of the industry. Thus Indian immigration was one of the instruments which assisted in the formation of a plantation system. But also important was the fact that from 1882 the Indians were able to grow canes themselves, thus forming a peasant sector in the industry. This was acceptable either because of continued labour shortages when the Indians settled on their own plots of land²⁸ or because the peasants could grow and supply cane at a lower cost than the estates.²⁹ Whatever the reason, however, that he was permitted to sell cane to the estates enabled the Indian to make his contribution to Trinidad society. Williams says that "the Indian cane farmer in Trinidad, cultivating cane on a small plot of land which he had been allowed to buy in exchange for a return passage to India, represented a challenge in Trinidad to the traditional method of production in the British sugar colonies in the West Indies. To that extent the indentured immigrant ... constituted one of the most powerful social forces for the future in the struggle for the establishment of a proper social structure and modern industrial relations."³⁰ Lastly, a plural society was created, and endowed with the attendant problems of integration which accompany such a development.

The period 1880 to World War I

The last two decades of the nineteenth century brought another in the series of crises to affect the British West Indian industry. This period saw the increased effect of British free trade policies,

27. West India Royal Commission, 1897. HMSO, p. 100.

28. Beachey, op.cit., p. 116. This work also discusses all aspects of British Caribbean Sugar in the last century.

29. West India Commission, 1897, p. 14.

30. Williams, op.cit., p. 121.

greater competition from the more efficiently organised and bounty-supported beet-sugar industry, as well as competition from Cuba. Relief came temporarily in the form of a change in markets. A new outlet was found in the United States. In the 1890s the problems were so great that it was feared that a total collapse was imminent. This led to the setting up of the Royal Commission of 1897. Nevertheless, the problems did bring some good results in that they forced some amalgamations and improvements in field and factory.

The United Kingdom, under her liberal trading policies, became the largest importer of cheap bounty sugar. The re-introduction of duties in Britain in 1901 could give little relief, since they applied to all sugar, regardless of origin. Even the removal of bounties by the Brussels Convention of 1903 could give little relief, for by this time the British West Indian Producers had lagged too far behind. Production ceased in many islands including Tobago. In Trinidad production fell from an average of 60,000 metric tons in the period 1880-1885, to 50,000 metric tons in 1910-1915.³¹ In most of the other West Indian islands production either stagnated or declined.

In the 1880s Trinidad became dependent on the United States market. The British public and industry benefitted from the influx of cheap beet and cane sugar. For the first time more than half of Trinidad's sugar went to the United States rather than to Britain. For the quinquennial periods 1886-1890 and 1891-1895³² exports to the U.S.A. were 67% and 55% respectively of total exports. But this outlet was unreliable. Sugar producers in the U.S.A. were becoming more vociferous. They wanted to expand their own production. Further, Cuba, Puerto Rico and the Phillippines came under American control

31. International Sugar Council, The World Sugar Economy, Vol. II, table 16, p. 29.

32. The West India Royal Commission, 1897, table III, p. 329.

33. *Ibid.*, pp. 14-15.

34. *Ibid.*, p. 17.

35. *Ibid.*, p. 100.

36. *Ibid.*

after the Spanish-American War. These areas would now receive preferential treatment in the American market. American capital for re-organisation was also available. Thus this outlet was only temporary and, once more, problems arose.

The West Indian Royal Commission of 1897 stated that "there can be no general or early recovery from that depression unless either (1) prices rise or (2) the cost of producing sugar in the West Indies be reduced."³³ The first suggestion of a rise in prices was out of the question, for it would cost the British consumer a considerable sum of money each year.³⁴ The ideas of countervailing duties and a grant of bounty on West Indian sugar were also dismissed. In order to achieve a reduction in costs, the Commission recommended improvements, such as the establishment of central factories, better cane varieties, and the encouragement of peasant cane-growing.³⁵ In addition, they recommended diversification, substituting "other profitable agricultural industries for the cultivation of sugar cane."³⁶ Thus diversification, or at least less dependence on sugar cane, which could have been more easily accomplished in 1838, was to be the answer, for Britain could now do without West Indian sugar.

The higher costs and market difficulties brought the closure of some usines and amalgamations of others, leaving only 39 sugar estates in 1897, compared to 56 in the previous year.³⁷ Some estates were put under coconut cultivation, and those in the environs of Port-of-Spain and San Fernando were sold for housing. Others closed because they could not afford the capital necessary to replace obsolete equipment. These latter were only equipped to produce muscovado sugar. In 1897, there were only 7 muscovado producers left, compared to virtually the entire industry in the 1830s.³⁸ The other producers were

33. Ibid., p. 8.

34. Ibid., p. 13.

35. Ibid., pp. 14-15.

36. Ibid., p. 17.

37. Ibid., p. 100.

38. Ibid.

manufacturing either centrifugal muscovado or vacuum pan sugar.³⁹ By this time all the estates were over 500 acres in size, and vacuum pan sugar accounted for more than half total exports.⁴⁰

Subsequent to the visit of the Royal Commission, improvements which had begun in the 1880s were continued. The fall in sugar prices and the resultant crises forced the amalgamation or abandonment of holdings. Now larger cultivated areas had to furnish canes for the improved mills. Where usine capacity exceeded that of cultivation within an estate, planters sought to buy canes from peasant farmers. Improvements did not stop at the mill. New varieties of cane from Barbados and British Guiana, replaced the old Bourbon variety. In order to cope with the transport of cane over long distances to feed the larger capacity mills, light railways were constructed, having been rejected earlier. Nevertheless, the improvements fell short, for it was not until the 1920s that mechanical ploughs were used. As yet the industry could not compete with Cuba. Plantations were still small as compared to those in Cuba, and grinding capacity, extraction rates, mechanisation and use of steam power all lagged behind developments in Cuba. All these features were applicable to the entire British Caribbean. It was only the internal disturbances in Cuba and the effects of the Spanish-American War that saved the British West Indies for a short time. The great expansion in Cuba was prevented only for a few years, for soon American capital and preferential treatment resulted in Cuban sugar replacing B.W.I., sugar in the United States. Consequently, there was a fall in local production by about 15% between 1880 and 1914.⁴¹ The period of depression came to an end with the greater demand for cane sugar in World War I.

39. Ibid.

40. Ibid.

41. International Sugar Council, op.cit., Vol. II, table 16, p. 29.

This brought new hope in the British West Indies. Rising prices resulted in abandoned lands being brought under production again.

The period 1914 to 1945

During this period, world sugar production showed three major declines, one during each world war and the other during the 'Great Depression'. Each decline was followed by a rise in world output, but by 1945 world centrifugal sugar production was only slightly higher than in 1914. In the British Caribbean, the years up to 1920 marked a phase of relative prosperity, but once more, as in the 1890s, the industry was faced with extinction, and another commission, The West Indian Sugar Commission of 1929-30, was formed to "enquire into the causes of the present depression".⁴² It repeated the recommendations of the 1897 Commission. Although it was a period of depression, or possibly because of this, there were further improvements in cane varieties and mechanisation, resulting in higher yields. At this time in Trinidad, peasant farmers were supplying about 50% of the total canes milled. Internationally, this period was marked by the re-establishment of a degree of colonial preference, the re-emergence of beet sugar as a competitor in the 1920s, and the abandonment of the principles of the Brussels Convention. Two major attempts to regulate world trade and production of the commodity, through the Chadbourne Agreement of 1931 and the first International Sugar Agreement of 1937, ended in failure.

Although the effect of World War I on world sugar was a decline in total production, this decline was only in beet sugar, which in 1914-15 accounted for 54.2% of total world centrifugal sugar production as compared to 26.6% in 1919-20.⁴³ Cane sugar not

42. West Indian Sugar Commission, 1930, p. 3.

43. International Sugar Council, op.cit., Vol. II, table 30. p.45.

only increased its share of total output, but it also expanded from 7.6 million metric tons (mmt) in 1914/15 to 9.1 mmt., in 1919/20. In Trinidad, production rose from 43,003 mt., in 1913 to a peak of 72,016 mt., in 1917.⁴⁴ Generally over the British West Indies, although expansion was not as great as in Cuba, production was more than one-third greater in the quinquennial period up to 1920 as compared to the similar period up to 1914. At the end of the War, prices rose sharply and reached their peak in 1920. The steep drop that followed in 1921 brought chaos to the Trinidad estates. Advances had been made to farmers on the basis of prices prevailing in 1920. Farmers could not repay, and hence estates could not recover money advances. Competition by millers for farmers' canes was partly responsible, and in order to prevent this from recurring, and also to eliminate haulage over long distances, the millers agreed in 1922 "to restrict the purchase of cane within defined areas."⁴⁵

From the low prices in 1921, there was a slight recovery up to 1924. Thereafter, continued over-production caused a general decline in prices, culminating in the crises associated with the 'Great Depression'. Over-production was achieved partly owing to the recovery in beet sugar in countries which suffered fighting during the War, and partly to the continued expansion of cane sugar. In 1919 an Imperial preference of 3/8d per cwt., was established for British Colonial sugar. This proved beneficial, but was not sufficient to combat the re-introduction of bounties for beet sugar. In addition, Great Britain itself in 1925 instituted a system of subsidy for home-grown beet sugar. According to the Sugar Commission of 1929-30,

44. Deerr, op.cit., Vol. I, p. 202.

45. Shepherd, C.Y., The Sugar Industry of the British West Indies and British Guiana with Special Reference to Trinidad, Memoirs of the Imperial College of Tropical Agriculture, Trinidad, Economic Series No. 1, May 1929, p. 12.

interference in world prices also came from the "temptation to Cuban producers to use their United States tariff preference to enable them to dump surplus sugar, and by the temptation to Java to take advantage of her low costs of production to drive other competitors out of the world's free markets."⁴⁶ Because of the crisis facing West Indian sugar industries, certain estates were abandoned and the Commission reported that the "representation that there is grave risk that the owners of many estates may be compelled to cease cultivation, must, we regret to say, be accepted as true."⁴⁷ The Commission also reported that while in colonies such as St. Kitts and Antigua the entire population would be affected by the loss of the sugar industry, the proportion in Trinidad would be one-third. The Commission's opinion was that the "primary cause of the present depression is the over-production of sugar."⁴⁸ During this period several amalgamations were carried out in Trinidad. Yet production showed a slight upward trend. Through the use of new cane varieties, inorganic fertilisers, the introduction of mechanical ploughing and land preparation, and a more successful fight against the froghopper pest after 1926, yields and production expanded. Estates and farmers increased production in absolute terms, but farmers increased their percentage contribution to about 50%. The Commission was of the opinion that "while improvements can be made in particular cases, the present depression of the West Indian sugar industry is not due to any lack of efficiency and cannot be remedied effectually by improvements in methods of production alone."⁴⁹ This Commission, like its predecessor in 1897,

46. West Indian Sugar Commission, 1930, p.11.

47. Ibid, p. 13.

48. Ibid, p. 13.

49. Ibid, p. 15.

recommended the settlement of a peasantry on the land, and drew attention to the large food import bill of Trinidad and Barbados especially. The Commission emphatically repeated the view of its predecessor by "expressing our strong concurrence in the view of Sir. H. Norman's Commission that no reform affords so good a prospect for the permanent welfare in the future of the West Indies as the settlement of the labouring population on the land as small peasant proprietors; and in many places this is the only means by which the population can in future be supported."⁵⁰ But because it saw the sugar industry as relatively efficient, the Commission also recommended a continuation of preferential treatment on a larger scale, and that the British Government should work towards international accord on this commodity. By implication, the Commission placed blame on former British Governments rather than on the West Indies sugar industry.

The effect of the 'Great Depression' on world sugar production was a decline from 25.4 mmt., in 1930/31, to 21.8 mmt., in both 1933/34 and 1934/35. Production in Trinidad did not follow this trend and continued to expand slowly (figure 5). After 1934, world production increased till it reached a peak of 27.1 mmt., in 1939. The effect of World War II was to produce another major decline in world output. Contrary to the rise in production of cane sugar during World War I, in World War II the response was in sympathy with world trends.

As alluded to above, the occurrence of low prices in the late 1920s and early 1930s resulted in several protectionist measures being taken. Many beet producing countries abandoned the principles of the Brussels Convention, and assisted their industries through import duties, bounties and subsidies.⁵¹ The general trend of over-production

50. Ibid., p. 57.

51. International Sugar Council, op.cit., Vol. II, pp. 32 and 37.

stimulated by the return to protectionist policies, necessitated some form of international co-operation. In 1931, the Chadbourne Agreement set out to restrict production among the participating countries of the Agreement. It failed to produce much long term stability owing to increased output by non-participants. In 1937, the first International Sugar Agreement was signed, but because of the high levels at which quotas were set, it had no pronounced effect. Furthermore, this Agreement operated only for a short period before being suspended during World War II.

The last major decline of the modern period of Trinidad sugar saw a drop from 131,609 tons in 1941, to an average of about 74,000 tons in the years 1943-45. The most important reason was the lack of labour for the industry. For the first time in this century the industry suffered extensively from what had proved to be its major problem in the previous century. Agricultural workers found more lucrative jobs on the United States' military bases set up in the island. In addition, it was difficult to export sugar and import foodstuffs as was done in normal times. Some land was given over to food production for local consumption. The problems were investigated by the Benham Committee, in whose recommendations a system of planting subsidies was advised and adopted. Thus, whereas the effect of World War I was an expansion in Trinidad's sugar, the effect of World War II was a contraction by almost half.

This period also marked the beginning of mechanisation of some field operations. Prior to the 1920s, land preparation was mainly manual. In 1924, the first mechanical ploughs were used by a local estate. There was a continued expansion of mechanisation in the 1930s, but this was only true for the estates. All cane farmers

stimulated in various parts of the world, and...

51. West India Royal Commission, 1877, p. 100.

52. West Indian Sugar Combinations, 1937, p. 100.

53. International Sugar Council, annual, 1937.

continued land preparation manually until after World War II.

It may be noted that throughout the period 1895-1930, cocoa had replaced sugar as the major agricultural export of Trinidad. It was a combination of disease, the depression and West African competition, which led to a decline in cocoa, which had to be 'rehabilitated' after world war II. After 1930, sugar again became the major agricultural export, but was now displaced by petroleum and petroleum products to second place among all exports. The fact that sugar displaced cocoa was not due to an increase in acreage. Sugar cane acreage in 1896 was 33,805⁵², and in 1929 the Olivier Commission recorded 32,874 acres,⁵³ Production in 1896 was about 60,000 tons and in 1929 about 90,000 tons. The increased production was, then, the result of improvements in yields and extraction rates of sugar, with the one reservation that the entire farmer acreage might not have been taken into account.

The post-World War II period

This present period in the development of Trinidad's sugar industry has been the greatest expansion the industry has ever known. This parallels the general world pattern in both cane and beet producing countries. According to the International Sugar Council, the principal force behind this process has been the general world economic development.⁵⁴ High prices that prevailed at the end of World War II also accelerated expansion. For Trinidad, the main features of this period have been the further reduction in the number of estates and mills, the stability derived from the outlet provided by the Commonwealth Sugar Agreement, and a continued period of reasonable prices in the early 1950s. The removal of Cuban sugar from Western markets produced a considerable rise in prices in 1953, but, subsequently, over-production and the development of new sugar industries in various parts of the world, have resulted in very low

52. West India Royal Commission, 1897, p. 100.

53. West Indian Sugar Commission, 1930, p. 105.

54. International Sugar Council, op.cit., Vol. II, p. 47.

'freemarket' prices, with, in spite of a rising world consumption of sugar, a glut of the commodity.

In the quinquennial period 1945-50, world production averaged 24.6 mmt., compared to 51.3 mmt., in the quinquennial period ending in 1963.⁵⁵ This was an increase of over 100%. World production in 1968 was estimated at about 68.0 mmt. In Trinidad, the earlier five-year period showed an average of 130,000 mt. and the latter an average of 217,900 mt. The 1963-1967 period showed an average output of 226,540 mt.,⁵⁶ or an increase of about 75% over the immediate post-war period.

Whilst in the early post-war years there were 10 mills run by nine firms, at the present time there are only 6 mills run by three operators. The estates, who own the mills, have increased their acreage and production over this period. As far as farmers were concerned, they continued to expand their production in absolute terms, but could only maintain their percentage contribution to just above 30%, compared to about 50% in the early 1920s, and over 40% in the 1930s. Yet, it has been within this period that farmers have started mechanising land preparation, and making use of inorganic fertilisers. One of the three large estates has embarked on a programme of mechanical harvesting since 1962.

Expansion of the industry in this phase of its development has been mainly attributed to the benefits of a stable market at a reasonable price for about two-thirds of production, under the Commonwealth Sugar Agreement. This Agreement, together with the two International Sugar Agreements of the 1950s, helped considerably in stabilising the situation for a time, but massive over-production nullified the benefits that could be derived from international

55. Ibid, table 39, p. 57.

56. Information provided by the Sugar Manufacturers Association of Trinidad.

accord. Although over-production did not affect prices paid under the CSA, it has resulted in lower prices for residual exports sold on the 'free market'. The most important event of the present decade has been the removal of Cuban sugar from the American and other Western markets. This has meant that, recently, Trinidad has been able to obtain bigger export quotas to the United States, at prices that are higher than 'free market' prices. The possible return of Cuban sugar to the American market could prove catastrophic to Trinidad and other Caribbean producers if adequate arrangements are not made to obtain reasonable prices elsewhere.

At the end of 1968, a new ISA was reached which became effective in January, 1969. This agreement has, as one of its goals, the attainment of minimum prices for 'free market' sugar of £33 per ton. This price was achieved and, by the second quarter of 1969, prices reached up to £38 per ton. Since then there has been another slump with prices falling below the minimum set by the agreement.⁵⁷ For Trinidad a welcome development was the decision of the British Government to continue the CSA indefinitely, and not to terminate it in December, 1974, as was feared by some Commonwealth exporters. For developing countries, two important aspects of the new agreement are that withdrawal of the negotiated price quotas is subject to six years notice, and that nowhere is the termination of the arrangements mentioned, as in former agreements. This latest agreement appears to be more flexible, so that changes can be introduced gradually without the threat of a sudden abrogation of the agreement.

Conclusion

If the period between 1498 and 1783 is dismissed as being insignificant in the history of Trinidad's sugar, one can see that,

57. Czarnikow, C. Ltd., Sugar reviews, 1969.

unlike most other Caribbean territories, Trinidad has experienced the vicissitudes attached to this commodity for less than 200 years. Yet it is this history which has affected the present-day society more than any other single factor. Although it is over-shadowed by petroleum in the economy, sugar is still the most important agricultural export crop. Furthermore, it is the largest employer of labour in the island. The composition of the heterogeneous population, too, is a direct result of the needs of the industry historically. From the preceding account, one sees a few flashes of prosperity, but more generally, prolonged periods of difficulty. Nevertheless, the island depends on the industry to a considerable extent, both as an employer and for export earnings. Recent production trends show that production may stabilise at about its present level, but general opinion in the industry is that it should be expanded.⁵⁸ How is production or any expansion of the industry to be shared between its two main sectors, large estates and cane farmers? For the well-being of the industry and the country, it is necessary to know this. Before this can be discussed, one must have a knowledge of both types of production. The characteristics of the plantation sector, with its large capital outlay and resources, and application of modern mechanized processes, are better known. It is to the cane-farming sector that greater attention will be given in this study, but before this is attempted, the present organisation and operation of the industry will be discussed.

58. TICFA, The Cane Farmer, Vol. 10, No. 3, March 1969, p. 2. Also other issues.

CHAPTER II

THE OPERATION OF THE SUGAR CANE INDUSTRY

An historical examination of the sugar industry of Trinidad has shown that, up to 1882, it consisted only of the planters who owned their mills or 'usines'. Since the depression¹ of the 1880s, the industry has had a dichotomous existence with the peasants increasing their contribution to over one-half of the canes produced in the 1920s. Subsequently, although farmers increased their production, their percentage contribution fell. Some commentators have said that the peasant sector grew out of the need to settle workers in the sugar growing areas to provide labour,² and others that it was because farmers would be able to produce cane more cheaply.³ But cane farming created its own requirements for labour, contributed to labour shortages for the estates and caused them to depend even more on farmers.⁴ It has been accepted that both sectors of the industry are important contributors, and must be regarded as partners⁵ in the industry and are both dependent on a large group of workers, who also have their own representative labour union. It is difficult

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1. Girwar, N. describes the peasant sector in Trinidad's sugar industry as 'a child of the depression' in "The Economics of Trinidad Cane Farming", TICFA, Combined Annual Reports, 1963, 1964, 1965, p. 129.
 2. Beachey, R.W., op.cit., p. 103.
 3. One view is that peasant production of the crop is encouraged during times of depression, TICFA, Combined Reports, 1963, 1964, 1965, p. 135; Also that farmers could produce the crop cheaply was supported by 1897, W. India Royal Commission, 1897, p. 14 para. 93.
 4. Gilbert Report, op.cit., No. 84, p. 6.
 5. For discussion of the relationship of the farmers and estates in Trinidad, see Girwar, N., The relationship of the cane farmer and sugar manufacturer in Trinidad. A paper presented to the British Caribbean Cane Farmers' Association, 1963.

4. The Orange Grove Factory, together with about 1,000 acres, was bought by the Trinidad Government, during 1960, from Messrs. Trinidad Sugar Estates Ltd.

to draw dividing lines between those workers who provide labour for the estates, those who work for farmers and the cane farmers themselves. Some farmers, in addition to supplying their own cane, also work for the estates, either in the fields or in transport; they may also work for other farmers; and estate workers may also provide part-time labour for farmers. The Government has always had some interest in the industry, but more recently this has been increased and is evidenced by the formation of the Sugar Industry Control Board and by Government's purchase of one of the sugar estates.⁶ In addition, the Ministry of Agriculture maintains an extension service, which, unfortunately, does not seem to have reached the farming community (see p.214). These, then, are the several sectors which make up the sugar industry. However, it is the estates or large plantations and the cane farmers who are involved in production operations.

The dichotomy that exists in the industry is reflected in the characteristics of each sector in the various aspects of cane production, from land tenure and land preparation through all the cultivation activities to harvesting and transport. Admittedly, there are some producers in Trinidad who are cane farmers by definition because they do not own their milling facilities, but who use production techniques similar to the estates and may not be truly regarded as peasant producers. Yet since these producers are regarded as cane farmers in Trinidad, they will be regarded as belonging to the cane-farming sector. Generally, though, cane farmers can be said to be constrained by the multiplicity of problems which affect peasant cash crop agriculture. The Government recognises this when it says that:

6. The Orange Grove Factory, together with about 4,000 acres, was bought by the Trinidad Government, during 1968, from Messrs. Trinidad Sugar Estates Ltd.

"The dominance of the plantation in the country's agriculture has resulted in a type of development geared to metropolitan interests, and the creation of a dualism in the agricultural structure.

"The basic problem of agriculture derives from the dichotomy between peasant and plantation agriculture. Peasant agriculture is characterised by under-capitalisation, low yields, and the lack of application of science and technology to the productive process. Plantation agriculture uses relatively large inputs of capital and has relatively high productivity per acre as a result of the organised application of scientific research."⁷

These, then, are some of the problems facing Trinidad's agriculture and especially its sugar industry. As most of this work will entail a study of the cane-farming sector, in this chapter the processes applied in estate agriculture will be described. The changes that have taken place in the structure of both sectors, especially since World War II, will also be considered, together with a discussion on farmers' deliveries of cane and its alleged irregularity,⁸ and the proportion of farmers' cane ground at the various mills. The purpose is to provide some insight into the organisation of the industry and the extent of its dichotomous existence. Although this section on farmers will in some ways anticipate what comes in later chapters, it must be mentioned that in this chapter most of the data was obtained from documentary sources, while in later chapters information is derived mainly from field work.

The estates

It has been estimated (table 3) that at the beginning of British rule in 1797, there were about 160 sugar estates in Trinidad. This number increased to over 200 before Emancipation, but, thereafter, estates decreased in numbers. Through the many vicissitudes since then, amalgamations and closures have resulted in this total being

7. Government of Trinidad, Second draft five-year development plan 1964-68, p. 173, paras. 3 and 4.

8. This refers to the daily, weekly or monthly fluctuations in farmers' deliveries of cane to the mills.

reduced to the three large estates which exist today. One of these⁹ is by far the dominant producer, growing more than half the total cane produced and manufacturing over 80%, and in some years over 90% of the cane ground, including farmers' cane which it buys. This firm operates four mills and in the words of the Cane Farmers' Association it "strides like a colossus on the local sugar scene."¹⁰ Of the remaining two mills, one is now Government owned and the other privately owned.¹¹

It has been shown how the large number of mills declined progressively from the 1830s. The main reason was at first labour problems and, later, low prices, which led to a shortage of capital among the small planters. The consequences were either amalgamation of estates or abandonment. Lack of capital also meant that obsolete equipment could not be replaced, the money required being difficult to raise especially for the smaller planters. Moreover, modernisation in all its phases demanded that units of production should be larger. The need to modernise the industry and to maintain and even improve efficiency resulted in there being fewer and fewer mills and planters. It also led to company operated estates instead of estates owned by individual planters. This process of "consolidation either by merger or by the gradual absorption of the smaller and less economically successful units by the larger and more prosperous ones has been

9. Caroni Ltd. is the dominant producer, owning four of the six factories, and most of the land under estate cane. This firm is a subsidiary of the Tate & Lyle Group of Companies. This fact, that the firm is linked in all stages of production and marketing of the crop, has provoked criticisms from the Cane Farmers' Association. See TICFA, Submission to Commission of Inquiry into "The existing method of computing the price of canes and matters connected therewith", 1965, pp. 47-50.

10. TICFA, *Ibid.*, p. 47.

11. Messrs. Forres Park Ltd.

12. *Provided and 1963, Annual Statistical Digest, 1967, Central Statistical Office, Port-of-Spain, Vol. 1968, Table 113, p. 102.*

13. *Provided and 1964, Annual Statistical Digest 1962, Central Statistical Office, Port-of-Spain, May 1964, Table 109, p. 102.*

14. Personal communication with Cane Farmers' Association and Messrs. Caroni Ltd.

consistently taking place in the Trinidad sugar industry ever since the middle of the nineteenth century."¹² It was out of this process that the present-day industry developed. In 1948 there were 10 mills being run by nine firms; at present there are only 6 mills being run by three operators. The mills that were closed were two very small ones¹³ (Craignish and Hindustan) and two of medium capacities¹⁴ (Waterloo and Esperanza). Their holdings are still under cane cultivation by both estates and farmers.

The mill-operating firms also grow sugar cane and produce about two-thirds of all the cane grown. In 1967, out of an estimated acreage of 87,823¹⁵ under cane, 56,539 acres of estate cane were reaped at an average of about 26.13 tons of sugar cane per acre (figure 6). In that year 10.87 tons of cane were required to make a ton of sugar, or the tc/ts ratio was 10.87:1. This means that the estates produced an average of 2.4 tons of sugar per acre. This was the lowest sugar yield per acre since 1945, at least for the estates.¹⁶ As no separate figures are kept for farmers' canes, no figures are available for cane yields and sugar yields per acre for farmers. Some estimates have been made and are accepted as being correct by both estates and farmers. A cane yield of 18 tons per acre for all farmers has been suggested,¹⁷ but this does not hold true for all farmers, as is shown later in the results of the survey (table 12). However, with the assumption that this is so, and also that sugar yields from farmers' cane and estates' cane were the same in 1967, farmers would have produced 1.66 tons of sugar per acre

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12. Caroni Ltd. "Caroni Limited in Trinidad", c. 1964, p. 9.
 13. Craignish had a maximum milling capacity of 384 tons of cane per day. The figure for Hindustan was 480. Soulbury Commission report, 1948, p. 11.
 14. Waterloo had a maximum capacity of 1,800 tons cane per day. The capacity for Esperanza was 1,200 tons. *Ibid.*, p. 11.
 15. Trinidad and Tobago, Annual Statistical Digest, 1967, Central Statistical Office, Port-of-Spain, Dec. 1968, table 113, p. 102.
 16. Trinidad and Tobago, Annual Statistical Digest 1962, Central Statistical Office, Port-of-Spain, May 1964, table 109, p. 102.
 17. Personal communication with Cane Farmers' Association and Messrs. Caroni Ltd.

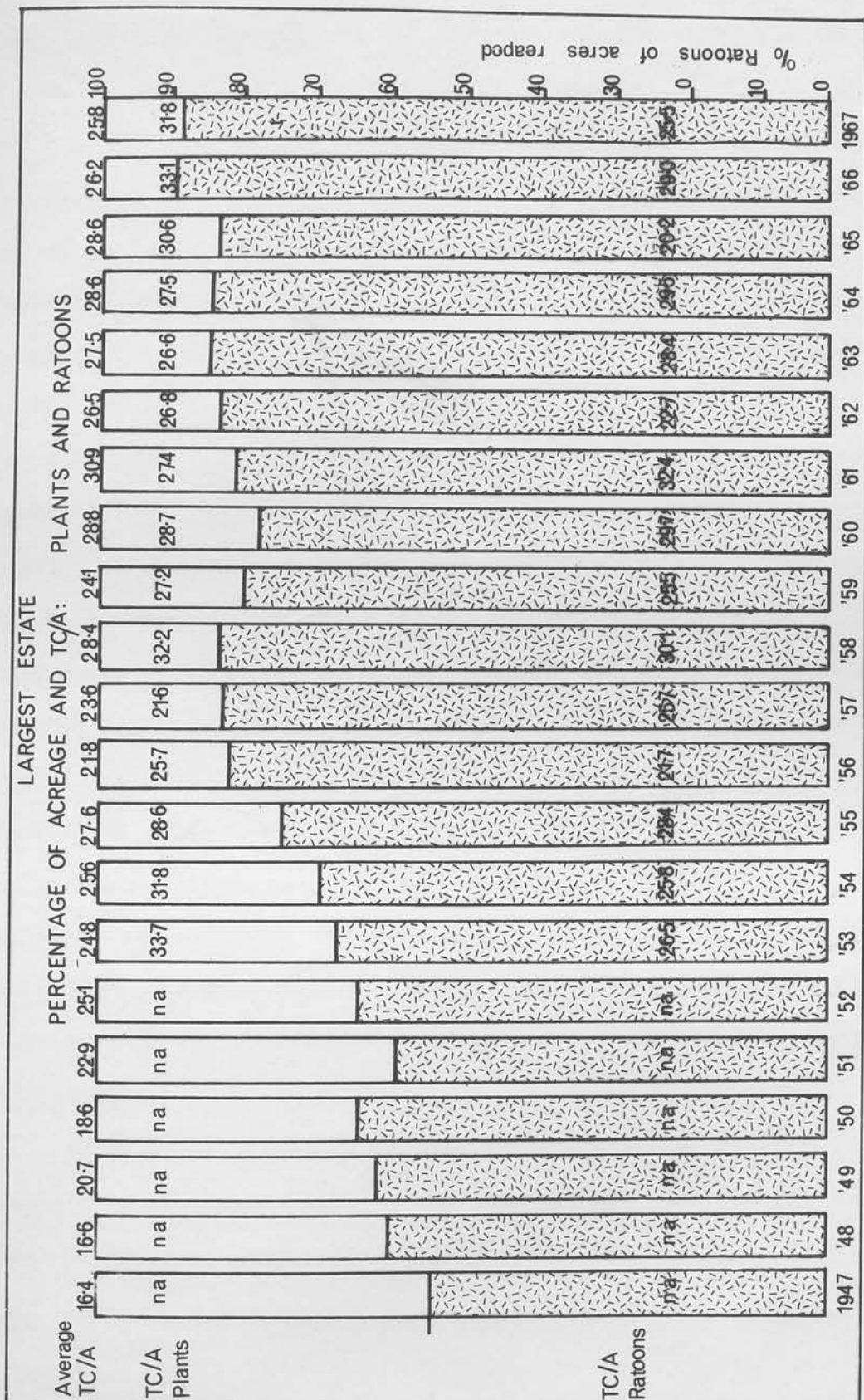


Fig. 6

in that year.

It is also estimated that estates and farmers occupy roughly similar acreages,¹⁸ but that the estates produce about two-thirds of the crop and the farmers the remaining one-third. Another estimate¹⁹ gives the estate acreage reaped in 1967 as 57,823 acres, and for farmers a figure of 30,000 acres. Obviously these two estimates are at variance. If the yield per acre is accepted as 18 tons for farmers, then the first estimate would have resulted in farmer production of over 1,000,000 tons of cane. If the second estimate is to be accepted, then farmer production in 1967 should have been about 540,000 tons. In 1967, farmers produced just over 673,000 tons of cane. It will appear, therefore, that farmers, if they occupy a similar acreage to the estates, have a lower average yield than that suggested by the estates themselves; if they occupy about 30,000 acres then they would be expected to have a higher yield per acre. If the figures for a number of years are taken instead of figures for one year, then both estimates are still at variance. It is more probable, as will be shown later, that farmers in general may have yields as suggested above, but that they occupy less land than suggested in the first estimate, and more than the 30,000 acres of the second estimate. The fact remains, though, that farmers produced about one-third of the cane milled, but at a lower intensity of land utilisation.

As is to be expected, the plantation sector is heavily capitalised and uses highly integrated and rationalised systems of

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18. Caroni Ltd. Quarterly Bulletin, "The Sugar Industry in Trinidad and Tobago," January 1966, p.2.
19. Trinidad and Tobago, Annual Statistical Digest, 1967, table 113, p. 102.

20. Report of a Commission of enquiry in to the sugar industry of Trinidad and Tobago, 1963, Vol. 46, p. 213, para. 37 102
Detailed description of Woodford Lodge System.

21. Caroni Ltd. Paper prepared by Henshall, D.S. 1967, p. 3. 80
Title given.

22. Ibid.

23. Ibid.

land preparation, crop cultivation, harvesting and transport, milling, export and marketing. There is an increasing amount of mechanisation in almost all phases of production. This is especially the case with the largest operator and less so with the two smaller plantations. These latter depend on the former for various services, such as machine shop work, and bulk-exporting facilities, which their own resources cannot provide.²⁰

Land preparation for the estates is completely mechanised and increasing mechanisation in the harvesting stage is resulting in changing cultivation practices. Formerly, almost all cane in the flat areas were grown across on cambered beds to facilitate drainage. Wherever mechanical harvesting is being undertaken, the fields must now be planted in long rows, a modified Louisiana Bank System,²¹ in order to permit mechanical harvesting and mechanical application of fertiliser and herbicides. Some areas are also under the Woodford Lodge System²² of fields, also a method of planting which uses long rows on cambered beds, but with surface run-off rather than the furrow drainage of the Louisiana System. The rate of change to cultivation practices which mechanisation requires is not available in exact figures, but it was estimated that by 1967 about 7,000 acres²³ had been converted. As some 5,000 acres²⁴ are prepared annually for re-planting (by the largest estate only), it may be assumed that an increasing proportion of this will be converted to the requirements of the machines. This applies mainly to fields in the flatter areas, which cover 57% of the holding of the largest estate.²⁵

20. All information on estate practices was provided by Messrs. Caroni Ltd.

21. Sugar Technologist's Association of Trinidad and Tobago 1967 Conference. Paper No. A/7, p. 5.

22. Report of a Commission of enquiry in to the sugar industry of British Guiana, 1949, Col. No. 249, HMSO, London, p. 37 for detailed description of Woodford Lodge System.

23. Caroni Ltd. Paper prepared by Hanschell, D.M. 1967, p. 3. No title given.

24. Ibid.

25. Ibid.

The lands of the northernmost estate are also flat, but the rest of the lands of the largest estate and all of the lands of the other small estate are slightly to severely undulating. The undulating lands permit only partial mechanisation of harvesting. In these areas, the cutting process will, with the present state of technology, continue to be done by hand, and self-loading trailers will be used to remove cut canes. The following table shows the increase in mechanised harvesting for the major operator only. The two smaller estates do not use fully mechanised harvesting, only mechanised loading.

Table 4: ²⁶ Mechanical and ²⁷ semi-mechanical harvesting of sugar cane

Mechanical harvesting		Self-loading trailers	
Years	Tons reaped	Years	Tons reaped
1962	2,302	—	—
1963	2,770	1963	17,290
1964	3,593	1964	24,462
1965	9,022	1965	41,034
1966	20,625	1966	119,002
1967	26,444	1967	298,381
1968	97,517	+ 1968	465,000
		+ estimated	

Source: Caroni Limited

28

Production methods

Each year, about 5,000 acres are prepared for replanting by the largest firm. Land preparation is carried out by crawler tractors. For the estates, planting usually commences shortly after the onset of

26. Mechanical harvesting refers to harvesting that is fully mechanised. From 1962 to 1968, three different kinds of mechanical harvesters were used by Messrs. Caroni Ltd. They are Massey-Ferguson 165, Cary and Duncana harvesters.
27. This refers to cane that is cut by hand and packed in bundles, which are winched mechanically onto trailers drawn by tractors.
28. This material was supplied by Messrs. Caroni Ltd.



rains in June and is completed within six weeks. The land preparation is completed in the dry season because of the greater mechanical power available. Formerly, in some areas, land preparation was carried out after the rains had softened the soil, because the power available was not sufficient. Fields vary from four to 30 acres in size, but are normally 10 acres. On the hilly lands cane is planted in continuous contoured rows spaced five feet apart. Some farmers in these hilly areas still plant their cane in rows which run up and down hill rather than along the contours.

Cane varieties

The varieties of canes grown by all the estates are bred at the West Indies Central Sugar Cane Breeding Station in Barbados. Although sugar yields per acre is the main aim of variety selection, there are other factors that must be considered. The prevalence of froghopper (*Aeneolamia varia saccharina*) attacks require that in the drier areas, where this pest is a more serious problem, resistant varieties are more acceptable. Sugar content per ton of cane is also extremely important, for the tc/ts ratio considerably affects the cost of production. In order to cut costs also, better ratooning varieties are desirable. As far as the estates are concerned, compromise is accepted except where special soils, or pests and diseases dictate otherwise. A more recent factor that has to be taken into account is mechanisation. It has also been possible to grow varieties with harder rinds, which are difficult to harvest manually, because now the mechanical cutters can more easily cope with this problem. This development has accounted for an increase, since 1964, in the planting of B49119, a high-yielding variety (figure 7). In order to regulate the reaping period more efficiently, some attention is being given to producing

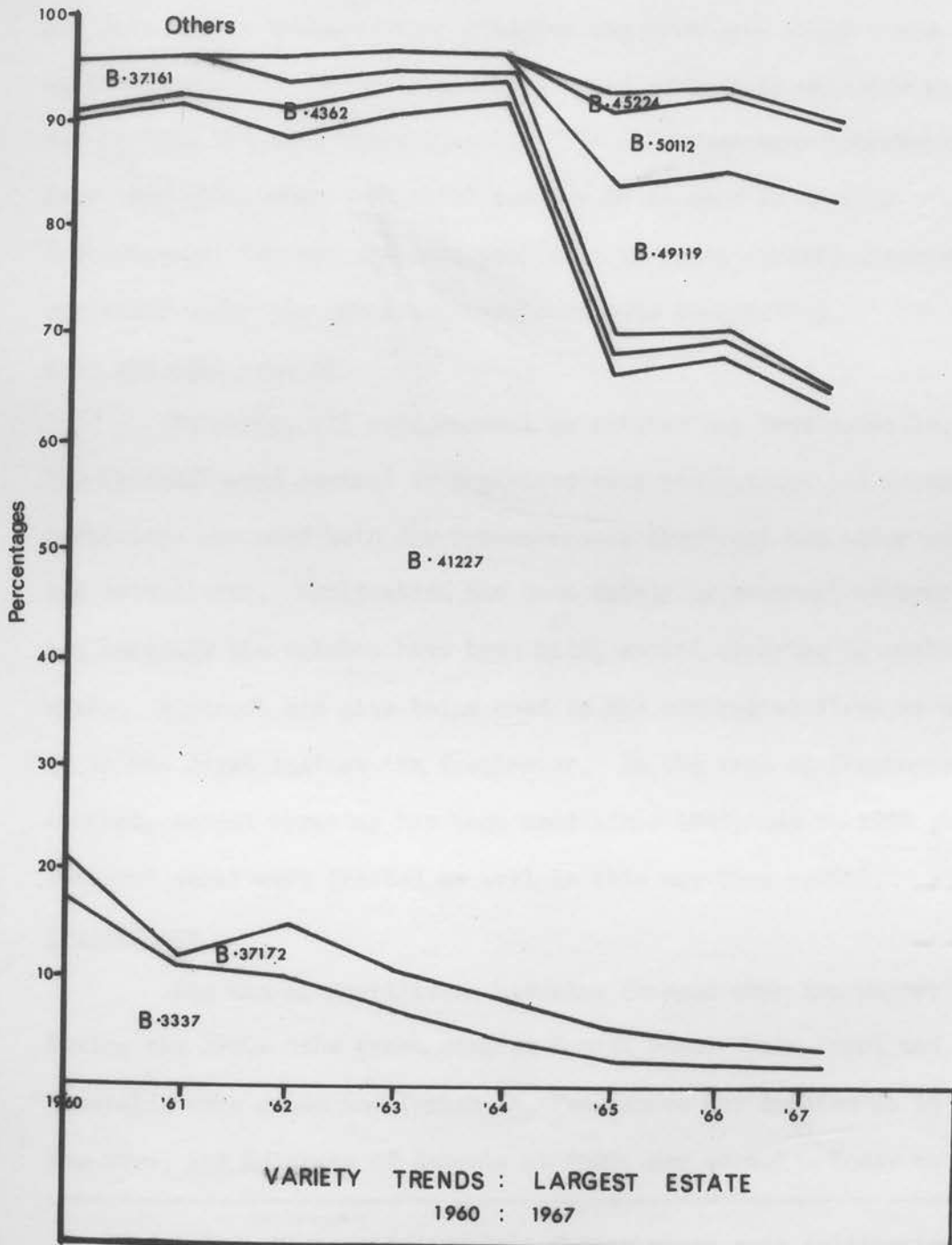


Fig. 7

varieties which will mature at varying times during the harvest. The pattern of sugar yield during the harvest is one which shows a lower sugar content at the beginning and end of the harvest. If varieties can be developed which will mature early, during mid-season and late in the harvest, then a higher and more even sugar yield will be achieved, for it is the high sugar content at maturity that can provide the best sugar yields. Thus, although many improvements have been made, much work still remains to be done in variety improvements. Farmers are only permitted to plant certain accepted varieties under the terms of their contracts (see p.185).

Weed and pest control

Formerly, all weed control on estates was done manually. Now chemical weed control is organised on a large scale and modern herbicides are used both for pre-emergence treatment and after weeds are established. Application has been mainly by knapsack sprayers, but recently the estates have been using aerial spraying to combat weeds. Aircraft are also being used in the control of fires as well as in the fight against the froghopper. In the case of froghopper control, aerial spraying has been used since 1965, and in 1967 farmers' canes were treated as well in this way (see p.191).

Fertilisers

The use of fertilisers has also changed over the years. During the 1920s "the green manures Bengal Bean, Woolly Pyrol and Canavalia were grown and forked in. Pen manure was applied at 15 tons per acre, and Sulphate of Ammonia at 2cwt. per acre." Today no

29. Vlitos, A.J. "Agronomic problems facing sugar cane cultivation in Trinidad", paper presented to the Third Annual Convention of the Caribbean Cane Farmers' Association in Trinidad, 1962, p.5.

30. Similar problems are faced in other cane producing areas. See Report of the sugar enquiry commission (1966), Jamaica, October, 1967, Ch.8, p.81, para.15.

31. Sugar Technologists Association of Trinidad and Tobago, 1967 conference, Paper No. A/7, p.1.

green manures are used and very little pen manure, because of the great cost of application. Sulphate of Ammonia is now applied at the rate of 4 cwt. per acre, generally by hand, to both plant canes and ratoons. In the case of plant canes, the application is split, the first being made just after germination, and the second some six weeks later. One application is made to ratoon canes. It has been found in field trials that the application of more than 4 cwt. of Sulphate of Ammonia does not result in compensatingly higher yields, though some farmers apply more than 4 cwt. In the north-central areas, potash deficiency is remedied by an application of 2 cwt. per acre of Muriate of Potash to plant canes, and $1\frac{1}{2}$ cwt. per acre to ratoons. In the south, some soils show responses to phosphate treatment, These soil types are mainly the Princes Town, Talparo and Freeport Clays,³² and receive 2 cwt. per acre of 40% Superphosphate at planting. Superphosphate is not applied to ratoon crops as it has been found that there is no further response. Mud press from the mills and some bagasse are also used by the estates, mainly during land preparation, when application is less expensive. Many farmers tend to follow estate procedures, but their fertiliser application methods cover a wide spectrum from no fertiliser applied in a few cases, to more than is required (table 37).

Harvesting

Almost the entire crop is harvested annually, except in certain years when acreages planted in the fall months are reaped as 'stand-over' cane some 16 - 18 months later. This practice is decreasing. Plant cane is 9 - 10 months old at reaping. The difference in yields of sugar cane per acre between 'stand-over' and 9 - 10 month plant cane is considerable as the results for the 1966 crop show (table 5). The former yielded 44.37 tons per acre as against 26.04 tons for the latter.

32. See Chenery, E.M. et al. "Soil map of Central Trinidad," Tolworth, Directorate of colonial Surveys, 1954, 1:50,000, 4 sheets.

Table 5: Reaping Results 1966 Crop, for Caroni Ltd.

	Acres Reaped	% of Acreage	Tons Cane	% of Total Cane Reaped	Tons Cane Per Acre
Fall Plants (2 Yr. Plants)	1,421.72	3.05	63,036.01	4.62	44.37
Spring " (1 Yr. Plants)	2,290.11	4.92	59,645.43	4.36	26.04
TOTAL PLANTS	3,711.83	7.97	122,731.44	8.98	33.06
1st Ratoons	6,852.56	14.72	214,239.48	15.68	31.06
2nd Ratoons	6,840.95	14.69	198,527.48	14.53	29.02
3rd Ratoons	6,704.98	14.40	186,571.19	13.66	27.82
4th Ratoons	6,829.99	14.67	194,657.94	14.25	28.50
5th Ratoons	6,703.88	14.40	194,636.69	14.25	29.03
6th & Older Ratoons	8,915.81	19.15	254,763.81	18.65	28.57
TOTAL RATOONS	42,848.17	92.03	1,243,396.59	91.02	29.02
TOTAL CROP REAPED	46,560.00	100.00	1,366,128.03	100.00	29.34

Source: Caroni Limited.

However, more than 95% of the crop is harvested annually. Among the advantages claimed for this are the greater freedom allowed in planning the reaping programme and a lessening of the worry of damage from frog hopper in two-year plants, in which it has been virtually impossible to control. The frog hopper attacks occur mainly in the wet season, and show three main periods of increased vigour (figure 8). Frog hopper control has also been a serious problem with ratoon crops and, with the increase in the amount of ratoon cane, annual reaping is more desirable. It is possible that with the greater mechanisation of harvesting, damage to cane stands may force quicker replanting than is presently practiced, with a consequent lessening of frog hopper damage.

The cane is burned³³ before reaping by the estates for both manual and mechanical operations. Farmers regard this as a sore point, because they have been penalised for selling burnt canes by being given a lower price than for fresh cane.³⁴ The cane is traditionally cut and topped by hand, loaded into carts, drawn either by water-buffalo or mules, and carried to a mobile crane which either transfers the cane to rail cars, high-sided lorries or tractor-drawn trailers, or stacks the cane for later transport to the factory. Transportation is on a 24-hour basis. On the hill lands, animal-drawn carts are being replaced by tractor-drawn self-loading trailers (table 4). This method is partially mechanised for the cane is cut and bundled on chains by hand and the bundles are then winched on to the trailers for

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33. It is interesting to note that in Jamaica cane cutters ask for higher wages to cut burnt canes. See Jamaica Commission, 1966. *op. cit.*, p. 89, para 50.
34. There is considerable controversy over this matter. Farmers are faced with a deduction of 60 ¢ per ton of burnt cane delivered. All the estate cane is burnt before harvesting and so farmers consider that they are treated unfairly. Moreover, farmers charge that the revenue so collected is not further accounted for (see pp. 215-16 in TICFA Submission cited above). The two Commissions of enquiry in 1948 and 1960 pronounced opinions on this matter, which in general sought that no fines should be made if farmers conformed to some rules. No action has been taken and only individual arrangements between some larger farmers and the estates were in operation. In 1968 this was spread over a larger number of farmers, but arrangements are still made individually.

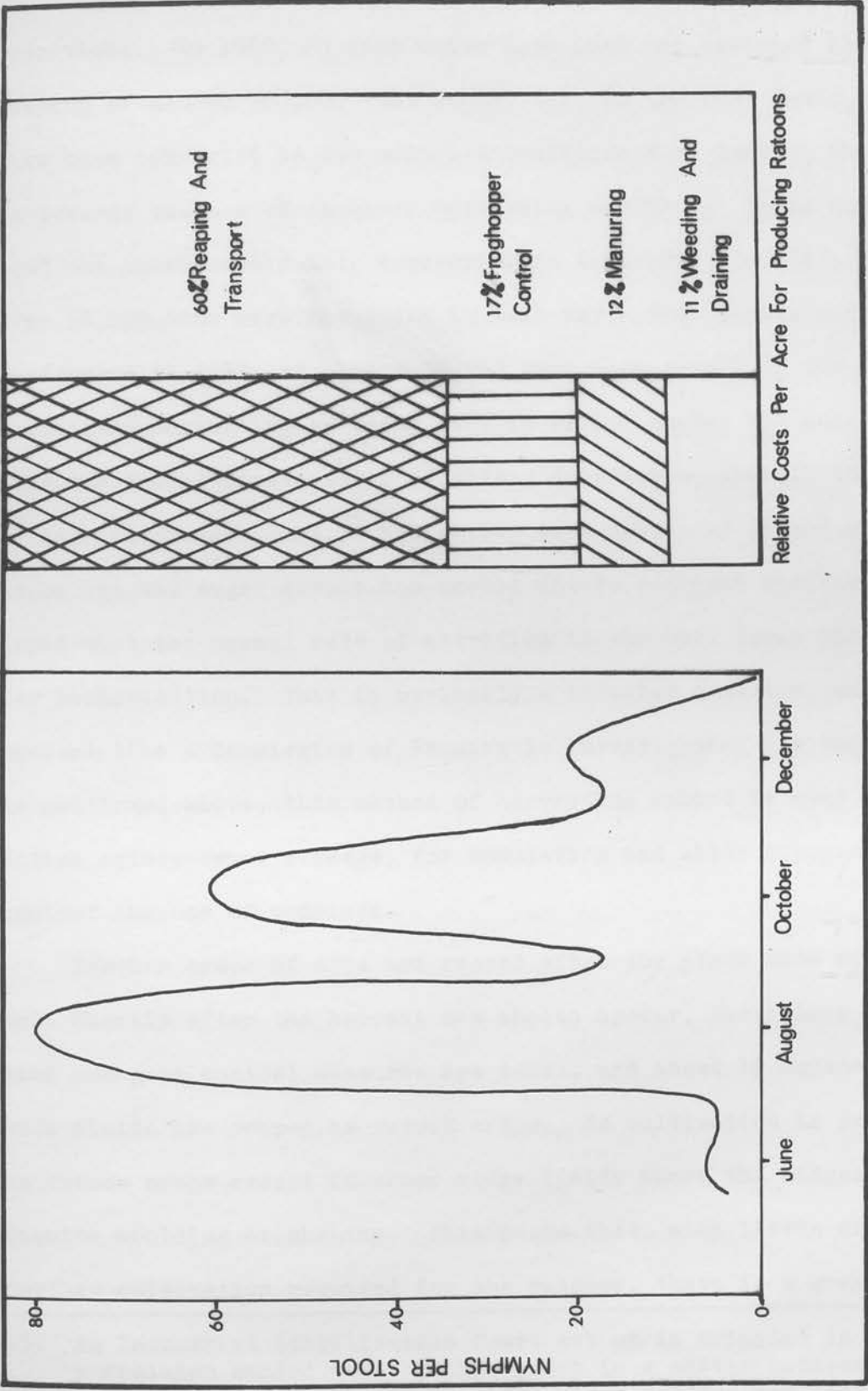


Fig. 8

transport to the crane site. This method has met resistance from cutters as cutting and bundling are now regarded as one operation, while formerly cutting and loading were considered as separate operations. In 1967, 69 such units were used and assisted in the reaping of almost 300,000 tons (table 4). On the flat lands, which have been converted to the modified Louisiana Bank System, the movement is towards the use of combined harvesting machines. These cut and load the cane directly into tractor-drawn trailers. In 1967, just over 26,000 tons were harvested in this way. This figure was almost quadrupled in 1968, as almost 98,000 tons were reaped by the combines. Mechanical harvesting is being used to reduce costs, but many people fear the social consequences of this. Government, through the findings of its Industrial Court,³⁵ has agreed to a system of phased mechanisation and the sugar estate has agreed not to retrench workers. It is hoped that the normal rate of attrition in the work force will make way for mechanisation. This is obviously a troubled question, and at the present time a Commission of Enquiry is investigating its implications. As mentioned above, this method of harvesting cannot be used over the entire estate-owned acreage, for undulating and hilly topography militates against the use of combines.

Further crops of cane are reaped after the plant cane has been cut. Shortly after the harvest new shoots appear, fertiliser is applied, weed and pest control measures are taken, and about 12 months later such fields are reaped as ratoon crops. No cultivation is practiced on ratoon crops except in those ridge fields where the ridges require moulding or shaping. This means that, with little or no further cultivation required for the ratoons, there is a great reduction

35. An Industrial Stabilisation Court set up in Trinidad in 1965, and a decision handed down by this court in a matter between Messrs. Caroni Ltd., and the All Trinidad Sugar Estates and Factory Workers Trade Union, whereby a system of phased mechanisation was accepted.

in costs, and a change in the various proportions of expenditure applied to plant and ratoon canes (figure 8b). (Equivalent figures for plant canes were not available, but some idea of relative costs for plant canes can be found from table 26.). With the aim to lower costs of production, the tendency has been towards an increase in the proportion of the crop reaped from ratoons. Up to 1950, this proved difficult because froghopper damage could not have been controlled on a wide scale. Up to that time, just over half the crop was reaped as ratoons (figure 6). Subsequently, except for a setback in 1954, froghopper has been controlled on a field scale. The application of benzene hexachloride dusts to the soil around the cane stool was generally effective in controlling froghopper nymphs until 1957-58. Thereafter, 'trithion' dusts were used, followed by a rotational system, using three insecticides³⁶ in the control of froghopper in order to prevent resistance developing. In 1965, aircraft were used, first helicopters then fixed wing aircraft, spraying Sevin and Malathion L.V.C. This has continued successfully since then with a saving in cost. The average yield per acre has been maintained and there has been further increase in the number of ratoons carried (figure 6). At the present time over 90% of the harvest is from ratoons. Length of ratooning varies, but is now generally to six or seven ratoons (table 5). In 1966, about 8% of the crop of the largest operator was harvested from plant canes, the rest being from ratoons, averaging just over 14% of the acreage harvested for first and subsequent ratoons up to the fifth, with little reduction in the yield per acre. This has only become possible because of the control of the froghopper, the fertiliser application programme and improved management in the field.

36. Vlitos, A.J. and MERRY, C.A.F. "Control of the sugar cane froghopper", World Crops, December 1961, pp. 471-2.

Thus, while yields averaged 18 TC/A (tons cane per acre) in the immediate post-war years, they increased to 26 TC/A in the 1950s, and are now slightly above this figure, even reaching 30 TC/A in some years (figure 6). The longer ratooning permits the re-assignment of available tractor units to land conversion to meet the requirements of mechanised harvesting.

Thus far, the activities of the large estates have been described. The major characteristics of this sector are shown to be a high degree of capital intensity, as borne out by mechanisation of land preparation, and increasingly of harvesting, and the rationalisation of the processing activities. Aerial control of froghopper and fires, together with increasing attempts to mechanise other activities such as fertiliser application and weed control, are supported by intensive research into all aspects of production. These are only possible with the resources of a large company. Intensive production methods on a large scale, with optimum land utilisation, characterise the estate sector. For the peasant sector of the industry, such characteristics are applicable to a few only.

The farmers

Farmers, who are sometimes described as peasant farmers, cane farmers or peasant cane farmers, are those growers of sugar cane who do not possess their own milling facilities and who have contracted to supply sugar cane to mill operators. The contribution made by farmers is not restricted to the mere production of canes. It covers a wide spectrum, both economic and social. According to the Cane Farmers' Association³⁷, cane farming promotes the development of a class of "sturdy independent citizens" who contribute to the general

³⁷ TICFA, Submission, 1965, op.cit., pp. 6-7.

stability of the society, and who provide revenue to the state through direct and indirect means. Farmers also provide employment to the agricultural labour force and are, therefore, important as employers in rural areas. Moreover, farmers provide the millers with a third of their raw material, without any capital expenditure on their part. To the extent of their production, the farmers relieve the millers of problems relating to cultivation, reaping and transport of their share of the crop.

An analysis of production of cane sold by farmers between 1939 and 1967 shows that there has been an increase in the average tonnage supplied by each farmer (figure 9). In 1939, the average production per farmer was 30 tons. Over the five year period ending in 1945, average production was also 30 tons per farmer. For a similar period ending in 1950, average production per farmer was 42.6 tons. In the five-year period ending in 1967, the war-time average was more than doubled, reaching 72.5 tons. The lowest recorded average since 1939 was 24.5 tons in 1944, and the highest 77.9 in 1965. Average production per farmer, however, is not sufficient to provide a clear picture of the changing size structure of the cane-farming sector. As statistics are compiled annually in groups classified according to size of production,³⁸ it may be more meaningful to examine the changes that have taken place in each production group since 1939 (figure 10).

The first production class of farmers, those selling up to 5 tons of cane, numbered 3,605 in 1939, representing 27.9% of the farmers, but produced only 2.8% of cane sold. For the period 1939-1945 (inclusive), a period of seven years, this group comprised on average 25% of the farmers and supplied 2.5% of cane. The average

38. This is discussed in Appendix I.

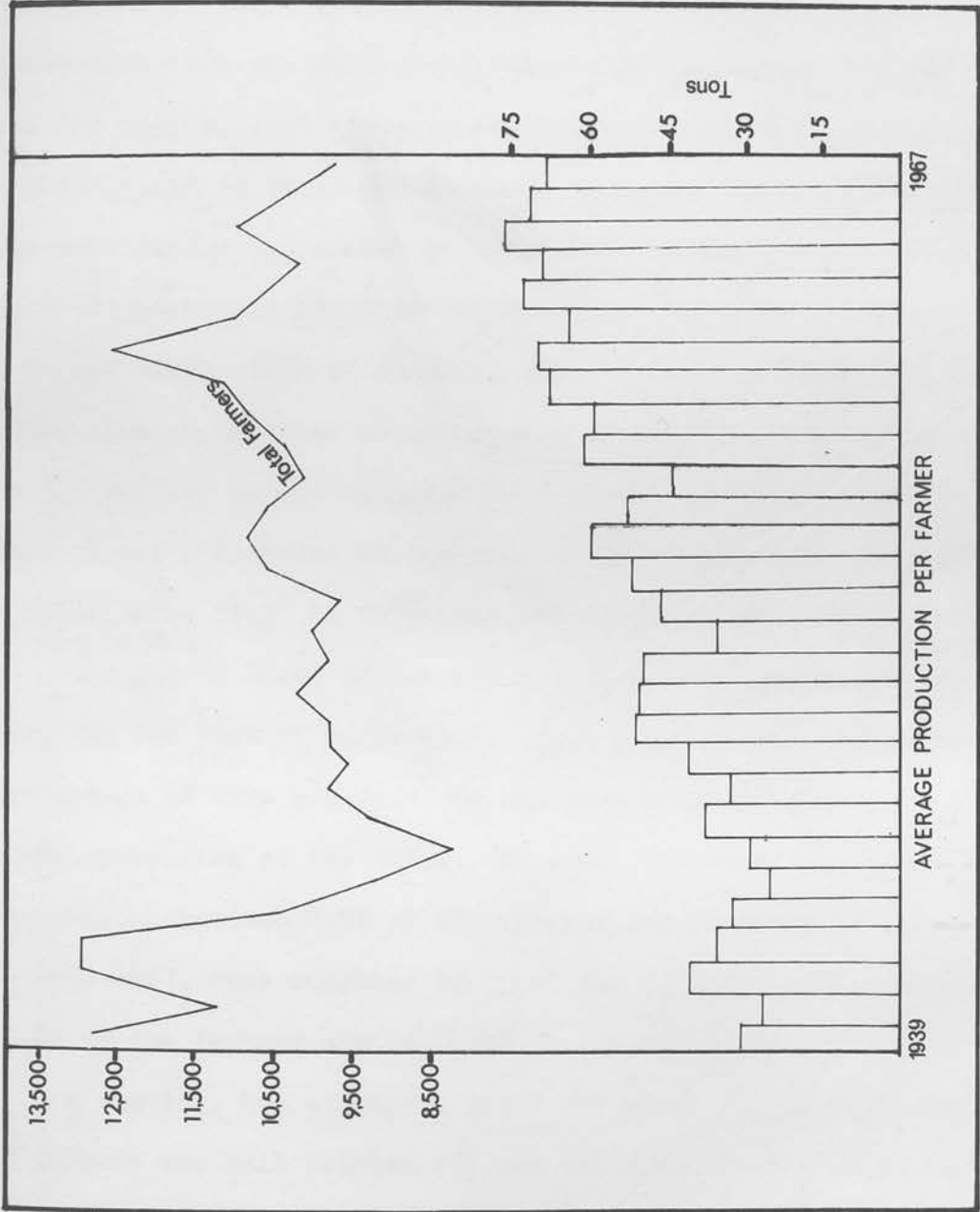


Fig. 9

number of farmers in this group, at this period, was 2,755. For a similar period between 1961 and 1967, this group decreased to about a quarter of its size, averaging 683 farmers, comprising 6.2% of the farmers and supplying 0.3% of cane.

The second group of farmers, those selling between 6 and 20 tons, showed also a general decline both in numbers and percentage of production when the equivalent periods are compared. In the earlier wartime period, this group supplied on average 15.7% of farmers' cane and comprised 39.7% of the farmers, numbering on average 4,505. In the more recent septennial period, they supplied only 4.4% of farmers' cane and comprised 23.3% of the farmers, numbering on average 2,530.








The third class of farmers, those supplying between 21 and 50 tons, show an increase in the number of farmers, from 2,580 or 22.9% in the earlier period to 3,310 or 30.5% in the later period. However, they showed a decrease in the proportion of cane supplied in the two periods, from 23.2% in 1939-1945, to 14.6% in 1961-1967.

The fourth class of farmers are those who supply between 51 tons and 100 tons of sugar cane. This group showed increases in percentage of cane supplied, in absolute numbers of farmers and in their proportion of the total. In 1939-1945 they supplied 17.1% of the cane, comprised 7.7% of the farmers and numbered on average 870. In 1961-1967, they supplied 22.4% of the farmers' crop, comprised 21.6% of the farmers and numbered on average 2,352.

A similar, but stronger, trend was shown by the fifth group of farmers who sell between 101 and 500 tons of cane each. In 1939-1945 they numbered on average 437 farmers or 3.8% of the total, and supplied 21.3% of the cane. In the later period they increased to an average of 1,917 farmers or 17.6%, and became the most important

TRINIDAD

Classes of Farmers

7.	Over 1,000 tons	
6.	501 - 1,000 "	
5.	101 - 500 "	
4.	51 - 100 "	
3.	21 - 50 "	
2.	6 - 20 "	
1.	0 - 5 "	

Cumulative Percentages of Cane Farmers and Cane Production by Classes of Farmers

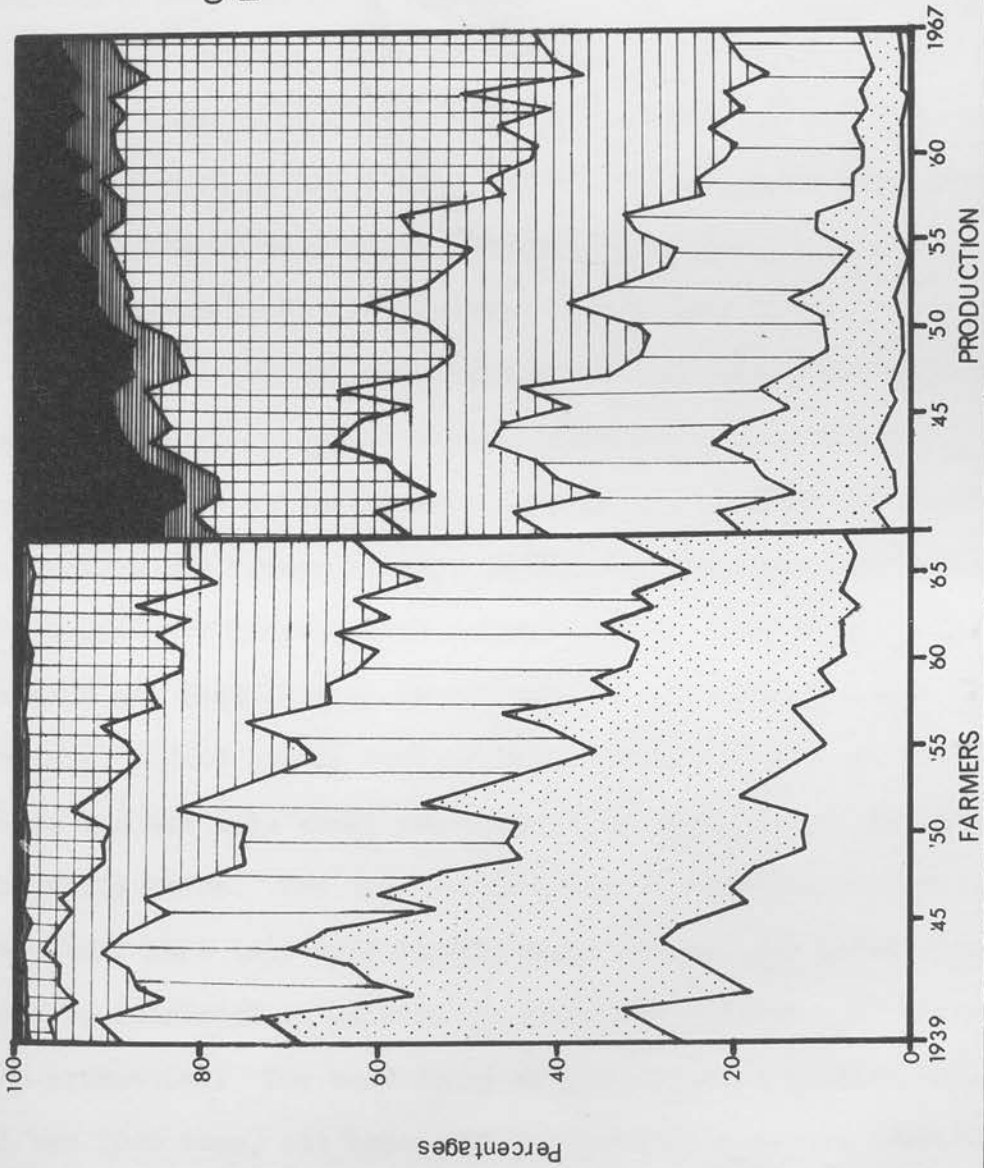


Fig. 10

group, supplying on average 46.0% of all farmers' cane. Farmers in this, and the following two categories, are thought of as 'true cane farmers' because they depend on this crop for most of their income.

The sixth group of farmers, those selling between 501 and 1,000 tons, showed a similar movement to the two immediately preceding groups. For this group the proportion of cane sold increased from 4.3% in the earlier to 5.9% in the later period. There were on average 22 and 68 farmers accounting for 0.2% and 0.6% of the farmers in the respective periods.

For the seventh group of farmers, those supplying over 1,000 tons, there was a slight decline in numbers from 25 to 22, but comprising 0.2% of the farmers in the two periods. The proportion of cane supplied by this class decreased considerably from 15.9% in the earlier period to 6.4 in the more recent one.

Generally one can see, therefore, that there has been some degree of rationalisation in the cane-farming sector of the sugar industry. This is reflected mainly by the increase in average production per farmer (figure 9) and the fact that the smaller producers have decreased in number (figure 10). The two groups of farmers who individually supply the lowest tonnages, that is, below 20 tons, showed steady decline since World War II. In the first group, there are now only about one-quarter as many farmers as there were in the early 1940s. For the second group of farmers, numbers are just over half what they were in the early 1940s. The third group of farmers increased in numbers by just over a third, but decreased in its production. The next three groups, that is farmers selling between 51 and 1,000 tons, all increased in terms of absolute numbers of farmers,

percentage of farmers and percentage contribution to production of each class. Together, these three groups now grow almost three-quarters of the total farmers' crop. The last group of farmers, individually supplying over 1,000 tons of cane, showed a large decrease in their percentage contribution to farmers' production. The same points are shown if one looks at the average aggregate production for each class for the two periods being considered. It can be seen that the first, second and seventh classes decreased in absolute terms, while the other four classes increased their absolute aggregate production. The average number of farmers was 11,194 over the earlier period and 10,881 over the 1961-1967 period, in spite of the move to other employment during World War II.

There has been no concerted effort to rationalise the cane-farming sector as has been the case with the estates, either on the part of farmers or Government. It is worth noting that the Cane Farmers' Association has not tried to encourage rationalisation, that is, has not encouraged a decrease in the number of small cane growers, the reasons possibly being that it is anathema to think of fewer farmers belonging to the Association, and possibly that the greater the number of farmers, the greater the bargaining position of the Association will be, and consequently the greater the interest of the public in the industry. However, the Association encourages farmers³⁹ to increase individual production rather than advises the smallest suppliers to opt out of the industry.

It is worth noting too, that in 1939 there were 12,914 farmers and numbers were maintained at about this level up to 1942. Subsequently, other more lucrative employment, especially on the United

39. Personal communication with officers of the Cane Farmers' Association.

41. MacKenzie Commission Report, op.cit., pp. 19-20.

States military bases, caused a decline in numbers, which reached their lowest point in 1945 (figure 9). The cessation of war meant that labour would return to its former occupations, and this together with the fact that a planting subsidy, recommended by a Committee of Inquiry⁴⁰ and adopted by Government, served to increase the numbers again after the War. The rise in prices owing to the Korean War and the guaranteed outlet provided by the Commonwealth Sugar Agreement of 1951 also cleared the way for expansion in the industry, and encouraged farmers to grow sugar cane. High prices in 1957 owing to the Suez crisis and in 1963, owing to the withdrawal of Cuban sugar from Western markets, resulted in increased numbers of farmers (figures 9 and 11). Low prices have prevailed since the last boom year of 1963, and numbers of farmers have declined. In 1968, prices were once more regarded as reasonable and this may result in an increase in the cane-farming population. Moreover, at the end of 1968, the Commonwealth Sugar Agreement was given a new lease of life, providing a guaranteed outlet for Trinidad sugar. A new International Sugar Agreement was also reached which has as one of its objectives a minimum market price which will not be far below the cost of production as has previously been the case (see p. 42). Lastly, in Trinidad itself, there was one major change as far as cane farmers were concerned. On recommendations made in a scheme suggested by the newly appointed Sugar Industry Control Board, farmers sell their cane in a more orderly manner than previously. The general opinion has been that up to now the farmers had to waste quite a lot of time waiting in long lines to sell one load of cane.⁴¹ Sometimes, only one cart load could be sold in two days. Under the new system, it was found that the turn round time

40. Benham Committee Report.

41. MacKenzie Commission Report, op.cit., pp. 19-20.

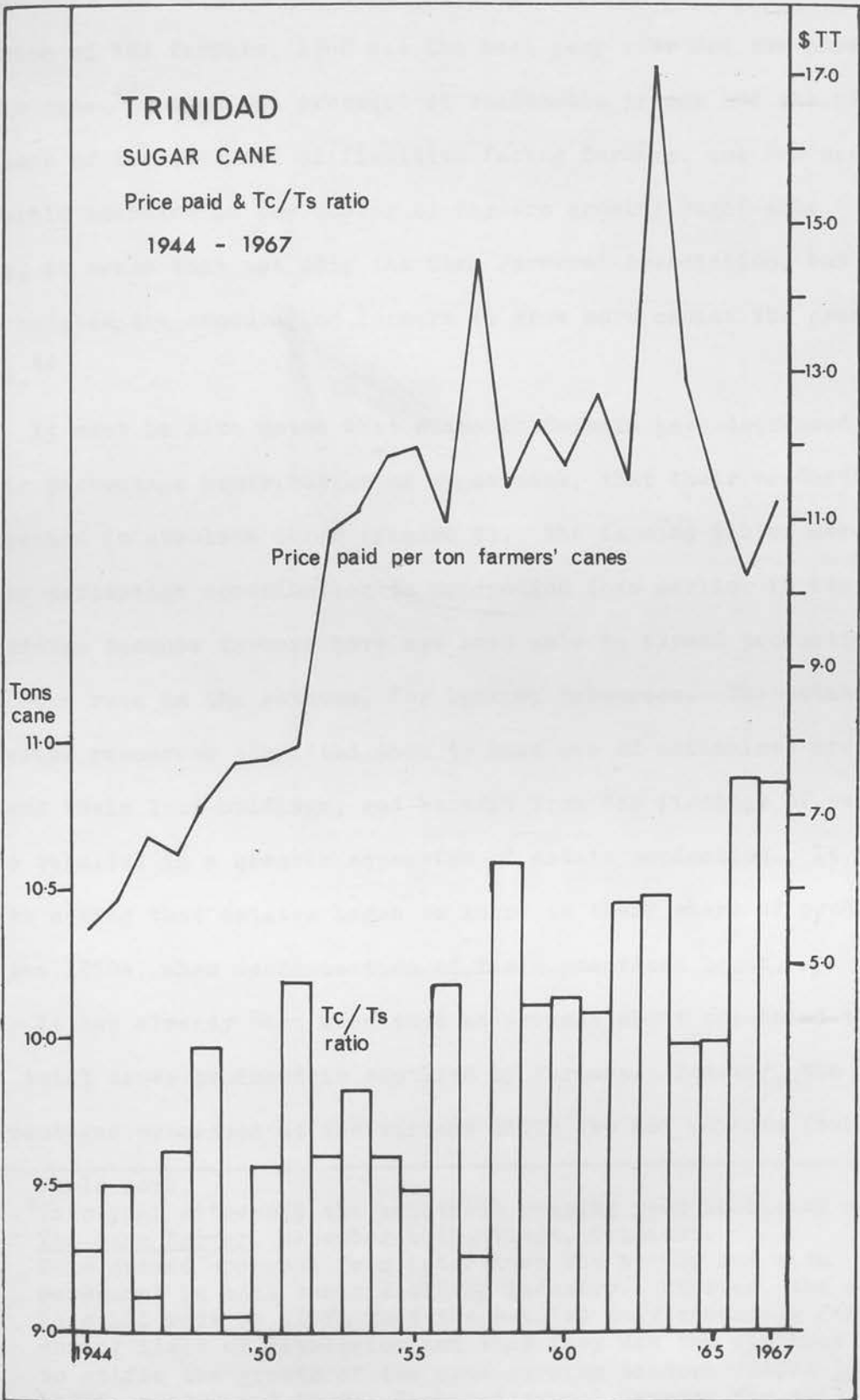


Fig. 11

at the purchasing points was reduced considerably, so that farmers could sell two or possibly three loads of cane in one day.⁴² In the opinion of the farmers, 1968 was the best year ever for the purchase of their cane.⁴³ With the prospect of reasonable prices and the removal of some of the internal difficulties facing farmers, one can see a possible increase in the number of farmers growing sugar cane. Moreover, it seems that not only the Cane Farmers' Association, but also the estates, are encouraging farmers to grow more cane at the present time.⁴⁴

It must be also noted that although farmers have decreased their percentage contribution of sugar cane, that their production has increased in absolute terms (figure 3). The farming sector makes a lower percentage contribution to production than earlier in its existence because farmers have not been able to expand production at the same rate as the estates, for lack of resources. The estates' superior resources permitted them to make use of mechanised processes, extend their land holdings, and benefit from the findings of research. This resulted in a greater expansion of estate production. It is worth noting that estates began to increase their share of production in the 1920s, when mechanisation of field practices began.

It has already been seen that at present about one-third of the total canes produced is supplied by farmers. However, the percentages processed at the various mills are not uniform (table 6).

42. Field work.

43. "This year witnessed the smoothest reaping year in living memory", The Cane Farmer, December 1968, TICFA, Trinidad.

44. This seemed apparent from interviews the author had with personnel in both sectors of the industry. However, the charge is still made by TICFA that the estates only encourage farmers during times of depression and that they use the contract system to stifle the growth of the cane-farming sector. TICFA Submission 1965, p. 203 and TICFA, Combined Annual Reports for 1963, 1964, 1965 p. 135.

Table 6: Estates and Farmers' canes according to sugar mills, 1956-1966.

Year	Usine St. Madeleine		Reform		Brechin Castle		Woodford Lodge		Orange Grove		Forres Park	
	Estates	Farmers	Estates	Farmers	Estates	Farmers	Estates	Farmers	Estates	Farmers	Estates	Farmers
1956	*305,643	*263,430			517,113	144,213	129,535	71,429	83,060	29,803	16,962	59,915
1957	*300,578	*181,779			553,246	120,320	162,396	67,611	72,714	32,610	13,347	41,926
1958	*360,096	*287,625			684,771	181,175	167,311	84,815	80,923	39,572	16,902	47,774
1959	*314,430	*307,129			614,081	172,243	173,474	84,963	104,664	30,707	14,671	52,100
1960	*373,550	*355,766			755,185	213,111	185,967	101,436	119,337	36,121	14,977	51,976
1961	*485,109	*428,815			822,594	228,521	198,773	106,625	130,924	40,372	19,351	76,567
1962	*404,031	*367,992			637,196	197,472	215,437	59,196	115,553	29,041	17,570	58,970
1963	*546,958	*415,366			728,313	217,003	170,214	40,766	123,639	35,465	25,972	75,271
1964	*521,317	*333,973			604,579	243,902	216,697	36,703	98,528	32,660	24,998	65,220
1965	406,027	269,096	86,450	65,990	760,221	379,397	233,442	41,494	123,381	30,184	34,443	68,257
1966	286,248	329,075	94,274	53,730	782,970	242,340	203,748	40,199	130,067	129,468	35,204	57,465

* Includes cane ground at Reform mill,

Source: TICPA Annual Reports.

For the largest cane-milling operator, if its four mills are considered together, then the global figure holds good. The different mills of this firm vary considerably in the percentage of farmers' cane milled. The farmers' share is relatively high at Reform and Ste. Madeleine Mills. Until 1960, farmers provided one-third of the cane for the Woodford Lodge mill, but since then the percentage has dropped considerably. At Brechin Castle between 1956 and 1966, only in one year, 1965, did farmers provide more than one-third of the cane. The average for this period at Brechin Castle was 23.4%. At Orange Grove, the northernmost mill, the proportion of farmers' cane has been about a quarter to a fifth of the total milled, but at Forres Park, in the south-central area, twice as much farmers' canes are supplied as estates' canes. Forres Park thus depends to a much greater extent on farmers' canes than any other mill. Since 1963, however, there has been a decrease in the percentage of farmers' canes crushed at Forres Park. This is mainly due to an increase in estate grown cane, rather than a decrease in farmers' production. In absolute amounts, the Orange Grove mill processes less farmers' canes than any other mill.

It can be seen that the three northern mills receive a lesser proportion of farmers' canes than the three southern mills. This reflects the general system of development and land occupation, job opportunities and topography over the areas as a whole. The northern areas are nearer to Port-of-Spain and are, on their northern edge, contiguous to the urbanised belt between Port-of-Spain and Arima (figure 17). There is, here, a demand for crops other than sugar cane, mainly market garden products and root crops. In the Orange Grove area, farmers generally rent their holdings from the estate, which has converted some of its lands for urban development.⁴⁵ Because of this,

45. For the development of a new town called 'Trincity'.

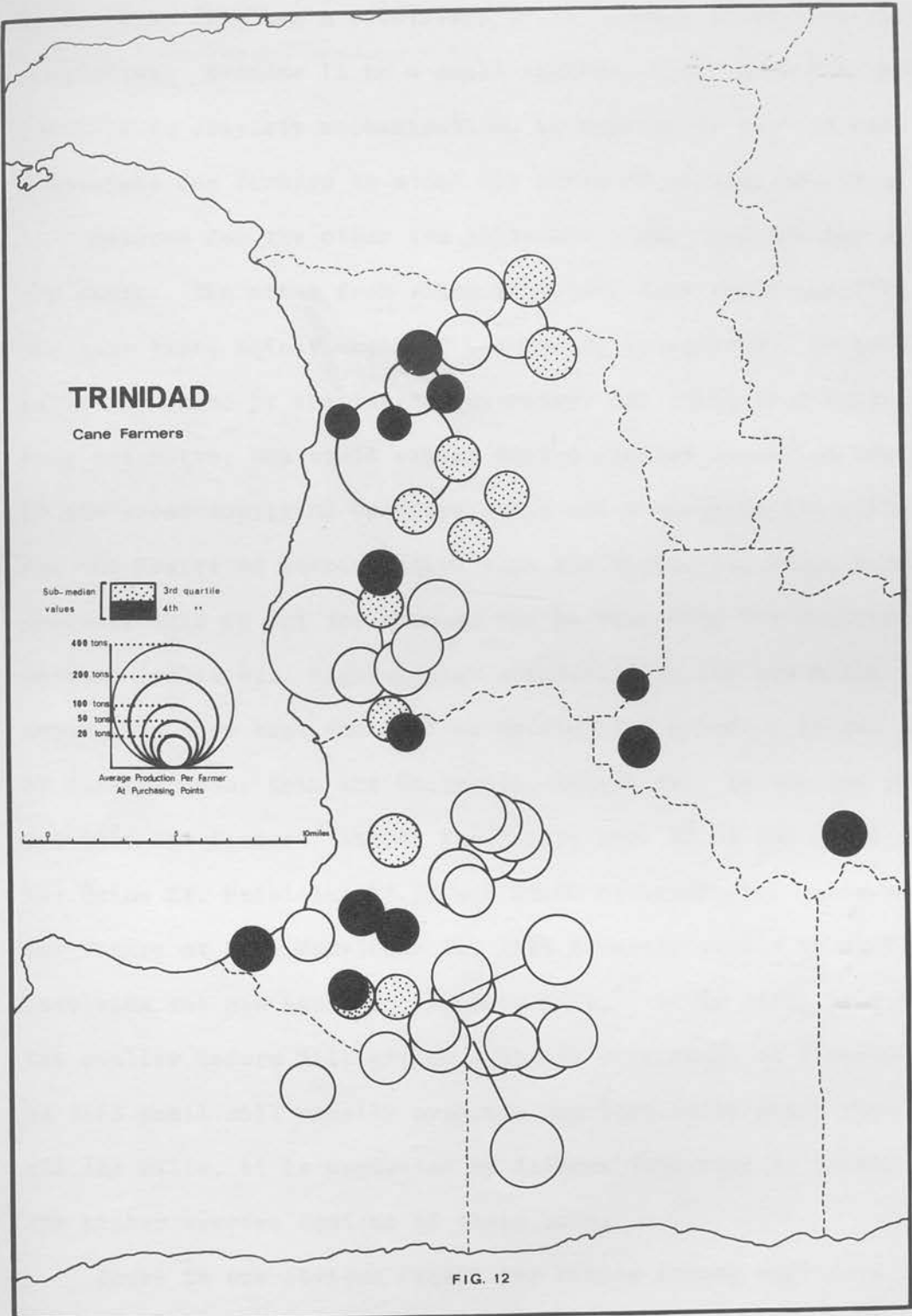
and also, because of proximity to the largest urbanised belt in the country, land values are high. This makes it unattractive to grow a low income crop on such lands. The result is that farmers who were tenants are being evicted from estate owned lands.⁴⁶ Some of these lands have been used for building purposes, retained by the estate itself, or are producing vegetable crops. This estate is too small to take advantage of all the benefits of mechanisation, but it occupies lands which are generally flat and can be effectively mechanised. Its scale of operation, with a holding of about 4,000 acres, is not large enough to permit mechanisation up to the level used by the largest operator.

In the north and central areas most of the flat lands are owned by the largest operating firm. Because its holdings in these areas are flat, it is here that the greatest degree of mechanisation has been used. The system of mechanised harvesting has so far been used only in these northern areas. With their greater resources, the estates, through the historical past, have progressively occupied these flat lands, resulting in the fact that all the northern mills are located, in the classic sense, surrounded by large acreages of flat land, producing estate grown canes. It may also be mentioned that the estates have used their superior resources to reclaim swamp lands for agriculture and to use relatively poor soils productively. Some farmer occupied lands are also owned by the estate. Most of this north-central area is less than twenty miles from Port-of-Spain and the urban areas of the north. A market, is, therefore, still theoretically available to farmers in these areas. Some farmers as

46. Farmers, during the course of field interviews, considered that they were being evicted, because they said that though they were being paid some compensation, they considered this too small. The estate thought that the compensation offered was adequate.

far south as Couva make use of this, and the vegetable growing in the McBean area is proof of this (figure 35). Moreover, Chaguanas and Couva are themselves market towns providing outlets for crops other than sugar cane. One can expect, therefore, that in the northern and central areas farmers will tend to produce less cane than the average, and that there will be more small producers of sugar cane (figure 12). The lack of sufficiently large peasant holdings, and the relatively insecure tenure, which are partly responsible for the above, make the farming community feel the pressures brought by urbanisation even more. Proximity to the largest urban population in the island results either in growing crops to meet the demands of this population, or provides opportunity for other jobs causing cane farming to be regarded either as a part-time or spare-time occupation (see Chapter V). The fact that the farmers in the northern areas do not have to depend solely on sugar cane for their income, results in poorer husbandry of the crop as compared to southern areas. More recently, the topography itself has affected practices in these areas, resulting in less farmers' cane being milled in the northern factories, especially the Woodford Lodge area. Mechanisation of harvesting has been possible and hence the greater emphasis of mechanised estate agriculture is in these flat lands. The drop in farmers' cane milled at Woodford Lodge factory is partly due to this. These then are the factors that are reflected in the relatively low aggregate contribution of farmers in the northern areas (figures 13 and 14).

In the south-central and southern sugar cane districts the three mills are Forres Park, Reform and the Usine Ste. Madeleine (figure 15). Statistics available (table 6) show that Forres Park has been dependent up to recently on farmers to supply three-quarters



of its cane. Since 1963 there has been an increase in the estate's own production, but even now the farmers' contribution is more than half. This firm has a relatively small acreage in an area that is undulating. Because it is a small concern, with lands that are not suitable to complete mechanisation, it appears to find it more convenient for farmers to stand the risks of growing the crop.

Returns for the other two mills are shown together for all but two years. The areas from which they both draw their supplies are of the same type, mainly areas of undulating topography. As these two mills are owned by the largest operator, and their land holdings are very extensive, one would expect that a similar situation would occur as in the areas supplying Woodford Lodge and Brechin Castle mills, except for the degree of mechanisation that the topography would permit. However, this is not the case as can be seen from the contribution of farmers (table 6). Figures that are available for the mills separately show that the smaller Reform mill grinds a larger proportion of farmers' cane than the Usine Ste. Madeleine. In the two years 1965 and 1966 the farmers' shares for Reform were 43.3% and 36.3% and for the Usine St. Madeleine 33.3% and 23.6% respectively. Although the low figure at Ste. Madeleine for 1966 is attributable to problems involving the new equipment at this mill,⁴⁷ it is still true to say that the smaller Reform Mill grinds a higher percentage of farmers' cane. As this small mill usually produces the best tc/ts ratio when comparing all the mills, it is suggested by farmers that this is partly due to the higher sucrose content of their cane.

There is one obvious reason for higher farmer aggregate

47. New equipment was installed at the Usine St. Madeleine in 1965-1966. There were teething troubles in both 1966 and 1967 harvests. In 1968 there were fewer breakdowns than in the two previous years, and this also contributed to the smooth running of the harvest mentioned above.

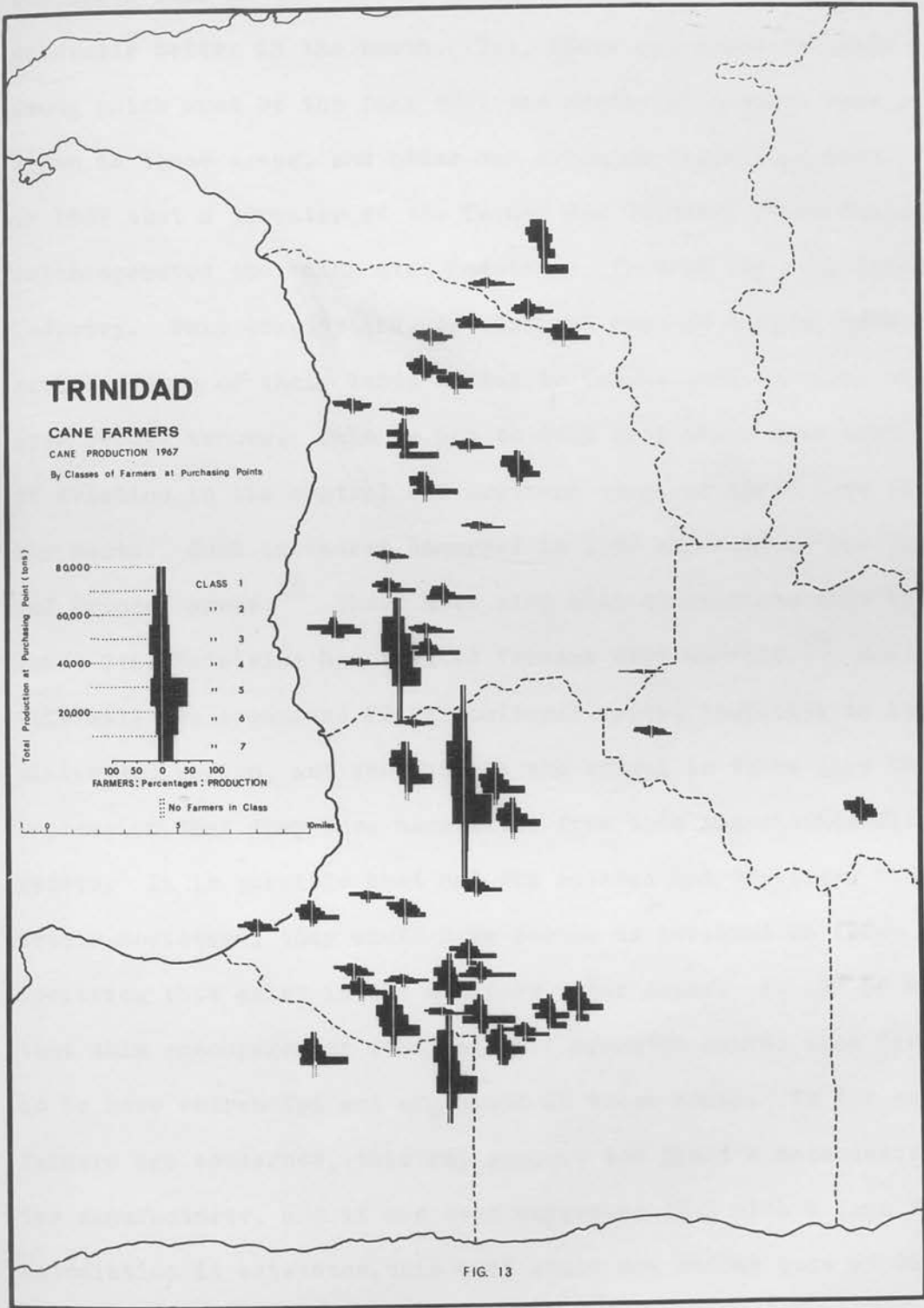


FIG. 13

production in the southern areas and, that is, that there are more farmers and a greater acreage of farmers' lands under sugar cane in the south than in the north. Moreover, soils are thought to be generally better in the south. Yet, there are other possible reasons, among which must be the fact that the system of peasant cane production began in these areas, and hence has stronger traditions here. It was in 1882 that a director of the former New Colonial Sugar Company, which operated the Usine Ste. Madeleine, founded the cane-farming industry. This company and, now also, the present owners, have a greater share of their lands rented to tenant-cane farmers, with a more secure tenure. This is not to deny that there have been threats of eviction in the central and southern areas as there have been in the north. Such instances occurred in 1956 and 1957 at Dow Village and Bronte' areas.⁴⁸ There have also been accusations that the Usine Ste. Madeleine has treated farmers very harshly.⁴⁹ However, this mill has organised 22 Agricultural Credit Societies in its hinterland region, and the farmers who belong to these give the impression that they have benefitted from this association with the estate. It is possible that had the estates not supported these Credit Societies, they would have become as moribund as those societies that exist in the northern sugar areas. It can be said that this encouragement from the mill operator caused cane farming to be more entrenched and organised in these areas. As far as farmers are concerned, this may produce too great a dependence on the manufacturer, and it has been suggested that with a Cane Farmers' Association in existence, this body could now assume some of the duties performed by the manufacturer. This would lead to a greater

48. Trinidad Guardian reports on 24th July, 1956 and 27th June 1957.

49. TICFA, Submission, 1965, p. 97.

TRINIDAD

CANE FARMERS

AGGREGATE PRODUCTION 1967

BY PURCHASING POINTS

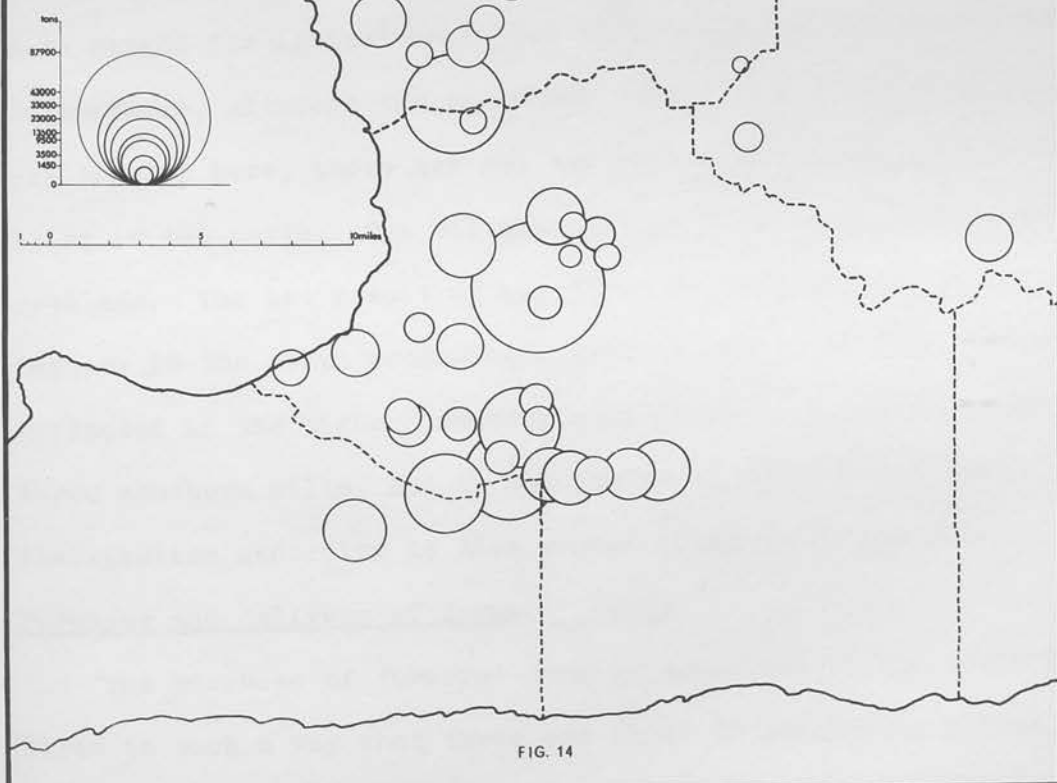


FIG. 14

independence of farmers and consequently a better bargaining position. Farmers have, however, benefitted from the assistance offered by this estate. Nevertheless, this alone cannot account for the greater farmer contribution in the south.

The southern districts are not in proximity to an urban population which is as large as the one in the north. San Fernando and its suburbs form the major urban area of the south, but it is relatively small. It, therefore, takes fewer farmers to meet the requirements of this population. Most of the vegetables sold here are produced around the edges of the southern Oropouche Swamp in the Debe-Penal area. Here too, as in the north, the farmers depend to a lesser extent on one crop, sugar cane, and the average production per farmer is lower than in most other southern districts (figure 12). It is also true that with a smaller urban population, there is not the same demand for agricultural land to be used for building purposes. Furthermore, although the petroleum producing and refining industries are located here, there are not the varied job opportunities that exist in the north. The oil industry is faced with retrenchment problems. The net result of all these factors is that there are more farmers in the south producing a greater amount of cane, which is reflected in the higher proportion of farmers' canes processed in the three southern mills, and in the number of farmers and their distribution according to size groups (figures 12 and 14).

Purchase and delivery of farmers' canes

The purchase of farmers' cane is organised by the three operating firms in such a way that there are about 70 purchasing points, called 'scales', spread over the entire sugar producing area, at which farmers' canes are bought (figure 15). Six of these scales are operated by

TRINIDAD

Purchasing Points



FIG. 15

the northernmost estate, six by Forres Park, and the rest by the largest firm. Scales are also located at the mills, except at the Usine Ste. Madeleine. The Malgretoute scale, which purchases more farmers' cane than any other, is located about two miles from the Usine and effectively operates as a 'yard' scale.

The average tonnages sold by farmers at all scales are worth considering for their distribution needs explanation (figure 12). This distribution is the result of several distinct situations. Generally, in those areas where crops other than sugar cane are grown commercially, average production per farmer is lower. Such situations can be seen at the edges of both the Caroni and Oropouche swamps, where the Bejucal No. 2, Jerningham Junction, Bernard Road, Caroni Savannah Road, Dumfries, Devil Hole and Woodland purchasing points, show averages that are within the range of the lowest quartile in the distribution. Penal, to the south-east of the Oropouche Lagoon, is the one major exception. Where vegetables are grown for urban markets, such as TSE, McBean (the St. Mary's scale) and a few southern scales near to San Fernando and Princes' Town, and where tree crops are grown, especially in eastern areas, such as Caparo-Todd's Road, Tabaquite, Brother's Road and Rio Claro, averages are also low. The average shown at TSE is anomalous to a certain extent because of the effects of two individual returns. One large supplier, whose holding is nearer the Woodford Lodge mill in the north-central areas, sold over 9,000 tons of cane to TSE in 1967. Another supplier of over 1,000 tons to TSE was the Government's experimental unit which should not be regarded as an individual farmer. The average at TSE as shown on the map is about 66 tons per farmer, but would be about 35 tons if the two largest suppliers were omitted. This would put the average

for TSE farmers within the lowest quartile range.

Another cause of low average per farmer in the north is that some farmers sell cane to both TSE and Caroni Ltd., so that by sharing their output the average is depressed. Such a situation also exists at Forres Park's borders with Caroni Ltd., as at Claxton Bay and Reform. The latter is also affected because some larger producers within the hinterland of the Reform mill sell their cane at Malgretoute because of the faster turn round at Malgretoute. Similarly, at Montrose, Chase Village, Arena and Calcutta in north-central and Cedar Hill No.1, Esperance, Cooper Grange and Cocoa in southern areas, the larger farms with mechanised transport sell their cane at scales which can accept mechanised equipment and where turn round is faster, such as at Woodford Lodge, Malgretoute and Cedar Hill No.2. Generally, almost all other scales show averages per farmer that are above the overall average and median value which are both about 69 tons per farmer (table 1 and Appendix III, table 4). These are generally in areas where farmers are dependent mainly on sugar cane. It will be seen that all these situations outlined are supported by the distributions shown on figures 35, 37, 38 and 17. Other evidence used to distinguish the causes for the distributions such as the individual returns of farmers and the sharing of individual output between two mills, were obtained partly from field investigations and partly from information supplied by the estates.

The percentages of farmers and production in each class for 1967 are shown on figure 13. The anomaly noted for the Orange Grove mill is better illustrated here.

It has been suggested that deliveries of farmers' cane over the course of a harvesting period are very irregular.⁵⁰ However,

50. Ibid., pp.201-218, and Sammy, R.V.A., op.cit., p.144.

although this may be so (figure 16a, b, c), figures for three years show that for one estate (four mills are combined) similar irregular daily fluctuations are shown. This alleged failure on the part of farmers is considered by the Cane Farmers' Association to be unfairly placed. They say that the estates themselves are partly responsible because they regulate transport facilities to the benefit of themselves and that sufficient transport is not provided at all times.⁵¹ The claim is that farmers are provided with adequate transport when it is raining and the estates cannot burn and harvest their cane.⁵² Whatever truth there is in the above, it is true to say that great difficulty is experienced by all, because of the large number of small farmers who all want to harvest their crop as quickly as possible. However, it seems that both farmers and estates show severe fluctuation in their deliveries, with the estates contributing more to the total fluctuations.

There are a great number of subjects that concern the relations between both sectors of the industry that can readily be reviewed here, but attention will be restricted to only two of them. These are the two most important and can be regarded as the source from which many smaller problems arise. They also affect agricultural practices and could also possibly affect factory efficiency. They concern firstly, the purpose of the Cane Farming Departments (CFD) attached to the estates and the expenditure involved in maintaining these departments, and secondly, the charge by farmers that the formula for sugar cane prices, on the basis of which farmers are paid for their deliveries of cane, is not one which is fair, nor one which will encourage improvements by farmers.⁵³

51. TICFA, Submission, 1965, p. 212.

52. *Ibid.*, p. 215.

53. *Ibid.*, pp. 122 & 124.

CARONI LIMITED (4 mills)

Estate & Farmers

Daily Deliveries of Cane

1966 - 1968

Trend line

Actual deliveries



SUGAR CANE
1,000 tons

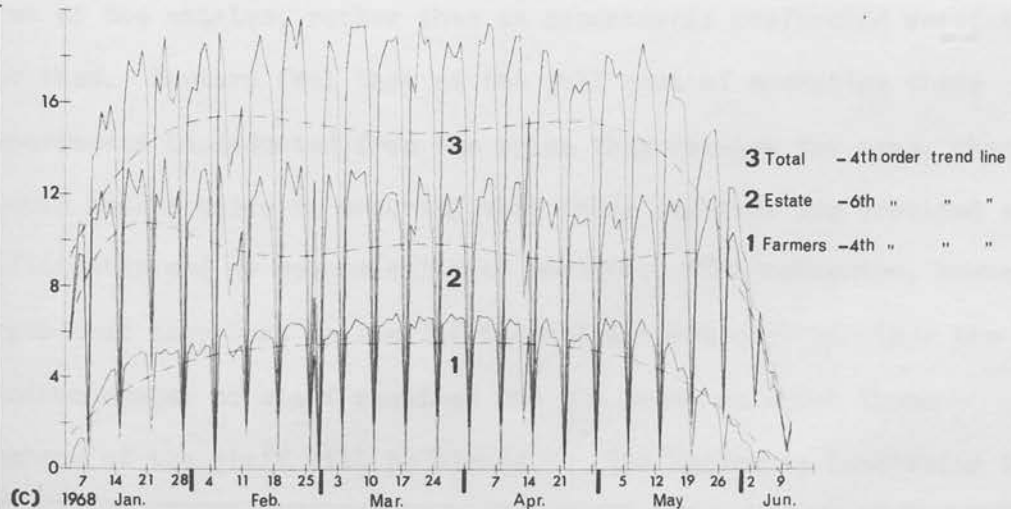
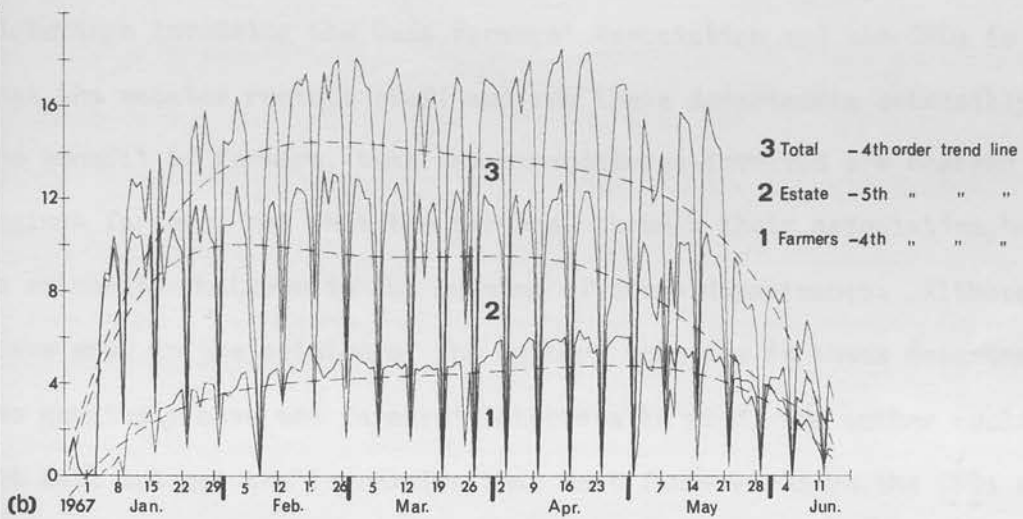
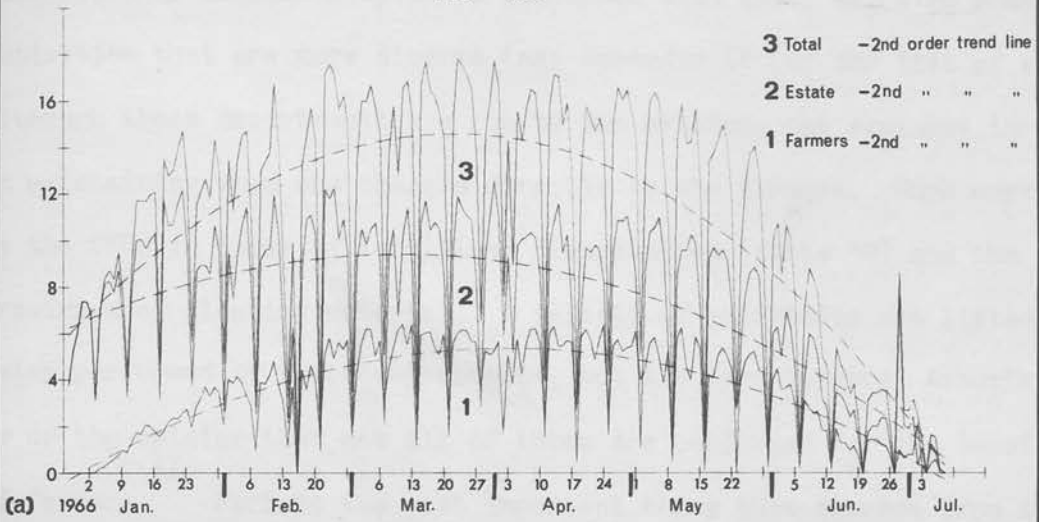


Fig. 16

The Cane Farming Departments

These departments of the estates exist primarily for the purpose of purchasing farmers' cane, but are also supposed to cover a wide field of related activities connected with same, and also some activities that are more diverse (see Appendix IV (b) for list of activities). Although these departments are run by the estates, the expenses incurred in maintaining them are charged directly to the farmers. Much work is done by the CFDs in terms of fertiliser distribution (table 38) and the provision of planting material. A variety of activities are listed as being performed by these departments, but the Cane Farmers' Association is of the opinion that not all of these are performed for the benefit of farmers.⁵⁴ Perhaps the most important thing that emerges from the bickerings involving the Cane Farmers' Association and the CFDs is that the estates recruit staff and run these departments ostensibly for the benefit of farmers, that the expenditures involved are charged against farmers, but that the farmers, through their association, have no authority whatever in the running of these departments. Although there are, in the opinion of the author, some men in these departments who genuinely have the farmers' interests in mind, the author could not fail but get the impression that most farmers regard the CFDs as arms of the estates, rather than as departments performing services for them. Farmers feel that as the full cost of operating these departments is deducted from the price they receive for cane, they should have a voice in ensuring that these services are provided as efficiently and as economically as possible. "The companies, however, argue that they must decide for themselves what they consider the minimum number of staff required and the grade on which these members of the staff will be placed."⁵⁵ The MacKenzie Commission felt

54. Ibid., pp.96-97.

55. MacKenzie Commission Report, 1960, p. 36, para. 175.

that it would be an imposition to dictate to management how a business is to be run and how much it should cost, but conceded that " the amount of these costs to be debited to the formula should be those that would be regarded as reasonable having regard to the necessity both for efficiency and economy." ⁵⁶ Such a result, the Commission suggested, could be achieved by the exercise of the Governor's (now this will refer to the Cabinet's) powers. ⁵⁷ However, this provision was already written in the relevant ordinance ⁵⁸ and, even when it appeared that there were great disparities in the expenses involved in the separate mills (see table 7), nothing was done to explain the differences to farmers. It is, therefore, easy to understand why farmers should be disgruntled over this matter, considering that the price of their product is affected directly. It seems apparent that there is lack of information and consultation with farmers, and that if this were improved, there would be greater chance of changing the atmosphere.

Table 7: Administration of Cane Farmers' Departments per ton of sugar produced from farmers' cane (\$ TT).

Usine Ste. Madeleine	+ Caroni Ltd. (Brechin Castle mill)	Woodford Lodge	Orange Grove	Forres Park	
1954	3.74	3.95	9.80	21.73	3.19
1955	4.20	3.03	7.80	20.02	2.99
1956	4.22	3.90	10.52	21.98	2.62
1957	5.10	6.84	9.32	18.95	3.37
1958	3.84	4.39	9.29	18.45	2.88

+ includes Reform mill.

Source: Mackenzie Commission Report, 1960, table XIX, p.35.

56. Ibid.

57. Ibid.

58. Ordinance No.61 of 1946 and unchanged in the Third Schedule to Chapter 23, No.12, Trinidad and Tobago.

grading other crops (table 28).

Of the defects that are due to the operation of the formula,

59. Ibid., Commission, 1965, p. 116.

60. Ibid.

The Cane Price Formula

The present formula was instituted in 1946 (see Appendix IV (a) for formula). It is a costs plus formula and, as such, guarantees a profit to the mill operators. Objections are raised by farmers against several aspects of the formula, but it is not the intention here to discuss in detail all of these. Only those aspects that affect agriculture, factory efficiency and strongly affect the price paid for farmers' cane are reviewed.

The problems arise firstly, from some inherent defects in the formula and secondly, from some which are apparent in its operation. The major inherent defect is that the formula is a costs plus one with the millers being guaranteed a small profit. This means that there is no risk involved in this aspect of the estates' operations and that all risks are loaded on to the farmers who share a residual sum. The Cane Farmers' Association contends that this defect is an invitation to the estates to inflate their costs.⁵⁹ It also contends that this is done by transferring costs so that certain expenditures that should be rightfully met by the estates themselves, are accounted in such a way, that farmers have to meet either some or all of these costs.⁶⁰ Whether this is true or not, the farmers do not feel that their interests are being managed properly by the State, which imposed the formula, for they feel that no detailed accounting is checked by the State.⁶¹ Moreover, the tendency has been for costs to rise faster than revenues from sugar and, with the formula being on a costs plus basis, moneys received by farmers are being constantly eroded. This could eventually lead to the demise of the cane-farming sector and is possibly one of the reasons why most farmers indicated during the survey that they wanted to leave farming altogether, or would consider growing other crops (table 28).

Of the defects that are due to the operation of the formula,

59. TICFA, Submission, 1965, p. 116.

60. Ibid.

61. Ibid., pp. 117 - 118.

the most important are those dealing with the various deductions made under the formula. These concern overheads, the expenses of running Cane Farming Departments and moneys for the rehabilitation fund from which the farmers have not benefitted. These deductions are made before the final price is computed. Further ground for discontent is provided because the estates have different accounting practices, and expenditure is not shown under the same headings by all estates. The institution of a common accounting system for all estates could reduce friction. The revenues from by-products also cause discontent. Of all the by-products, only the revenue from molasses is considered as part of the revenue due to farmers. The contention by farmers is that they should also benefit from the revenues of other by-products.⁶²

As far as agriculture is concerned, the formula does not encourage the farmers to grow canes of high sucrose content. Farmers are paid by the tonnage of cane sold, and although the sucrose content, or the tc/ts ratio, ultimately affects the price received, the farmers are encouraged to grow canes that will yield a high tonnage, be it fibre or sweet juice. One of the results of this was that the Bx or 'crackers' variety, which produces a large tonnage per acre, but of low sucrose content, was widely planted by farmers. This produced bad tc/ts ratios until the estates had to remove this variety from the approved varieties as set down on farmers' contracts.

Where the factories are concerned, because processing costs are deducted from sugar value, if the low cost is due to efficient machinery, then the farmers benefit. The converse may be also true. These may cancel each other out, but this is wrong in principle. However, the estates have no particular incentive to increase the efficiency of processing farmers' cane for if it does then the

62. Ibid., p. 195 and from the author's discussions with officers of the Cane Farmers' Association.

farmers will benefit. Efficient cultivation and processing of the crop are thus not encouraged by the formula, but it must be conceded that the mills have installed new equipment at regular intervals. Lastly, the formula accepts the principle that two prices should be paid for sugar cane, one for the farmers, whose receipts are calculated through the formula, and one for the estates, whose canes fall outside the formula. If farmers are to be considered as partners in the industry, then the same price must be paid for all canes, or at least the price paid must be dependent upon the sugar content of the cane. In general then, one can say that these differences as they exist will have adverse effects on the cultivation of the crop by farmers and on mill efficiency.

The purpose of this and the previous chapter is to provide a general background to the development and present position of the Trinidad sugar industry. The relative contributions of the two sectors of the industry have been outlined and the major characteristics of estate agriculture described. It has been shown that the estate sector has achieved a high degree of rationalisation, but that the peasant sector is still burdened with too many small producers, though it too has seen some rationalisation and has experienced some structural changes between World War II and the present time. Some of the difficult problems involving the relations of both sectors are discussed, but no attempt is made to provide definitive statements on the various subjects. Some of these problems are engaging the attention of a Commission of Inquiry.⁶⁴ In the past, relations between the two sectors can hardly have been described as good, but this must not cause one to deny that each sector has benefitted from the other. The next chapter deals with land use in the sugar cane

64. The Commission of Inquiry into "The Existing Method of Computing the price of Canes and matters connected therewith." This Commission was set up in 1965, but has not concluded its deliberation nor investigations, owing to several changes and at times lack of members on the Commission.

growing areas of Trinidad, and portrays how both sectors are juxtaposed spatially.

An examination of the history of Trinidad would show that development proceeded most quickly in the western part of the country. To a great extent this was the result of environmental factors, and later of socio-economic processes. Because the conditions under which sugar cane can be grown commercially are met mainly in this part of the island, because development in the eighteenth and nineteenth centuries in the Caribbean meant sugar cane, and because the Trinidad economy had its beginnings at that time, it is not surprising to see that development took place in the areas that met the requirements of this crop. No complete land-use map has been published at any time, so that it is difficult to ascertain the extent of changes that have taken place since sugar cane was first produced commercially in Trinidad. Initially, the crop was planted around Port-of-Spain. Later its production spread eastwards and southwards to cover the flat western Paria coastlands, the area it occupies at the present day. In the latter part of the nineteenth century and in the first two decades of this century, cocoa occupied parts of the present-day sugar areas, but in the years following the depression of the 1930s, and in the post-World War II period, cocoa has been pushed further eastwards. Little is known of the detail and extent of these movements. Nevertheless, it can be said generally, that in the most recent period, except for changes at its boundaries, the sugar producing lands of Trinidad have remained on the western side of the island, the area covered by the map (figure 17 in pocket). This chapter

1. By 'sugar cane producing areas' is meant areas on the land-use map, figure 17.

CHAPTER III

LAND USE IN THE SUGAR CANE PRODUCING AREAS¹ OF TRINIDAD

An examination of the history of Trinidad would show that development proceeded most quickly in the western part of the country. To a great extent this was the result of environmental factors, and later of socio-economic processes. Because the conditions under which sugar cane can be grown commercially are met mainly in this part of the island, because development in the eighteenth and nineteenth centuries in the Caribbean meant sugar cane, and because the Trinidad economy had its beginnings at that time, it is not surprising to see that development took place in the areas that met the requirements of this crop. No complete land-use map has been published at any time, so that it is difficult to ascertain the extent of changes that have taken place since sugar cane was first produced commercially in Trinidad. Initially, the crop was planted around Port-of-Spain. Later its production spread eastwards and southwards to cover the flat western Paria coastlands, the area it occupies at the present day. In the latter part of the nineteenth century and in the first two decades of this century, cocoa occupied parts of the present-day sugar areas, but in the years following the depression of the 1930s, and in the post-World War II period, cocoa has been pushed further eastwards. Little is known of the detail and extent of these movements. Nevertheless, it can be said generally, that in the most recent period, except for changes at its boundaries, the sugar producing lands of Trinidad have remained on the western side of the island, the area covered by the map (figure 17 in pocket). This chapter

1. By 'sugar cane producing areas' is meant areas on the land-use map, figure 17.

describes the present land-use patterns of this part of the country and examines some of the factors which have contributed to its present state (also see p. 10).

Some aspects of the physical environment

The sugar cane growing lands of Trinidad cover most of the western side of the island, from the foot of the Northern Range to within a few miles of the south coast. The actual sugar producing belt varies in width from six miles, where it abuts on the Central Range, to fifteen miles in the Naparima Plain. The area being considered in this work is greater than the actual sugar lands, and comprises part of the county of St. George and almost all of counties Caroni and Victoria. This area is generally about twenty miles from east to west and about thirty-five miles from north to south. It is formed of the western sections of three major physiographic provinces. These are the Northern Plain, the Central Range, and the Southern or Naparima Plain (figures 18 & 19). These are flanked on the north and south by the Northern and Southern mountain ranges. Generally, the areas which comprise the sugar belt are well settled and road communications are relatively easy over most parts, except for access roads. Almost the entire area is drained to the Gulf of Paria.

The Northern Plain

This was the first area of widespread post-Columbian settlement. It is composed of Upper Miocene and Quaternary deposits of sands and clays, with alluvial terraces of Pleistocene age in the north. There are two major basins which occupy these lowlands. To the east is the North Oropouche River which flows to the Atlantic and is outside the sugar belt. The western areas of this plain are drained by the west-flowing Caroni River which enters the Gulf of Paria through the Caroni Swamp. This swamp is just over twelve

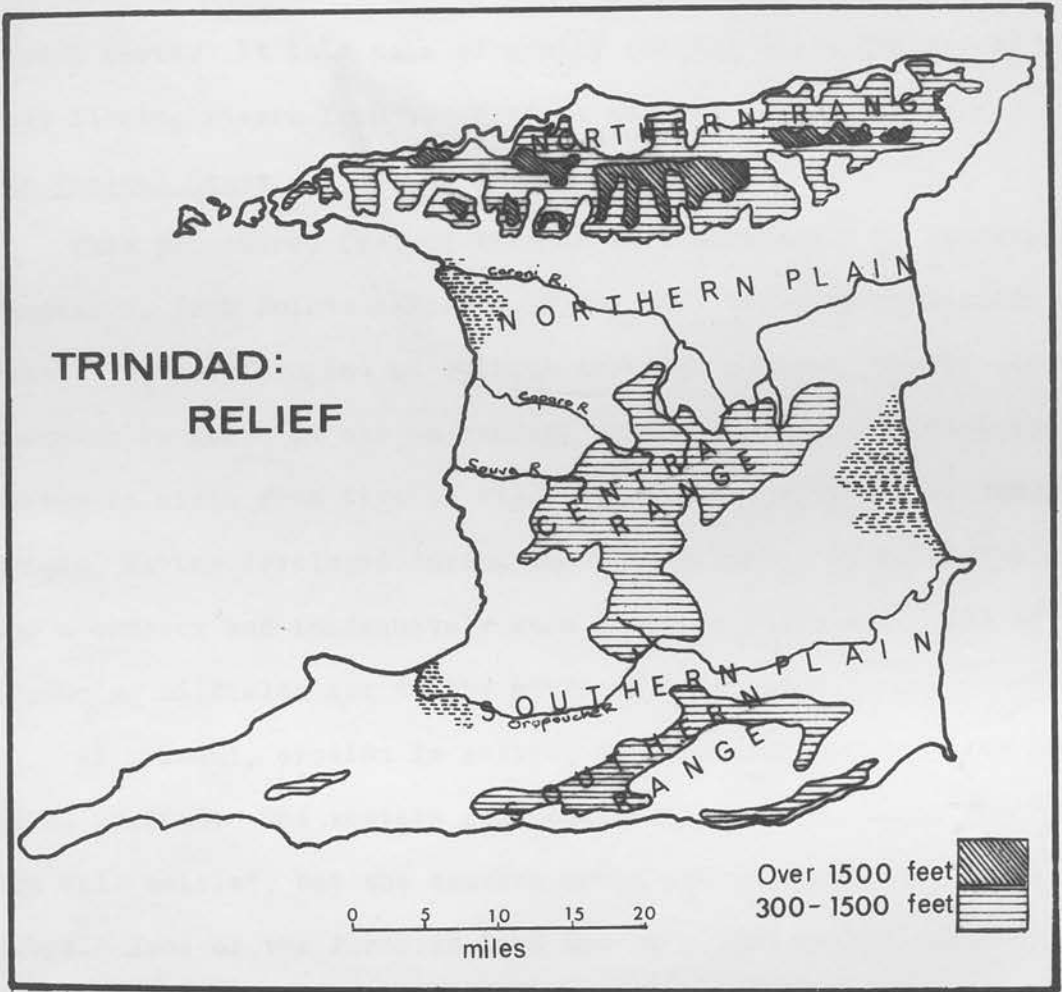


Fig. 18

square miles and it "represents the last stage of infilling of the Caroni embayment."² The maximum elevation of the plain, about 200 feet, occurs on the edge of the plain. Low relief results in considerable meandering of the river, and artificial levees have been built along the lower reaches to prevent flooding. Flooding still occurs in some areas.

The south-west corner of these lowlands does not belong to the Caroni basin. It is a zone of gently rolling hills drained by north-west flowing rivers from the Central Range.

The Central Range

This pronounced feature extends in a north-east to south-west direction, from Pointe-a-Pierre in the west coast to Manzanilla on the east. It, therefore, has an oblique trend as compared to the other two mountain ranges. It has an average height of under 800 feet and varies in width from five to eight miles. The Range is of Tertiary origin, having developed during the Pleistocene. It is asymmetric and has a complex and inadequately known geologic structure. All of the producing oilfields are to the south of this range.

At present, erosion is active, but conservation measures are being applied. The western sections, which belong to the sugar belt, are well settled, but the eastern areas are mainly under forest or tree crops. Some of the forested land has been used under land rotation methods, and it is in these areas that erosion provides the greatest hazards.

The Southern Plain

This is a peneplain, now divided into two main basins to the east and west. It is generally undulating with elevations of 150-200 feet. According to Suter "it is marine abrasion surface which has

2. Suter, H.H., The General and economic geology of Trinidad, HMSO, London, 1960, p. 10.

TRINIDAD

Geomorphologic Stereogram

after K.Rohr

Relief \pm 4 times exaggerated

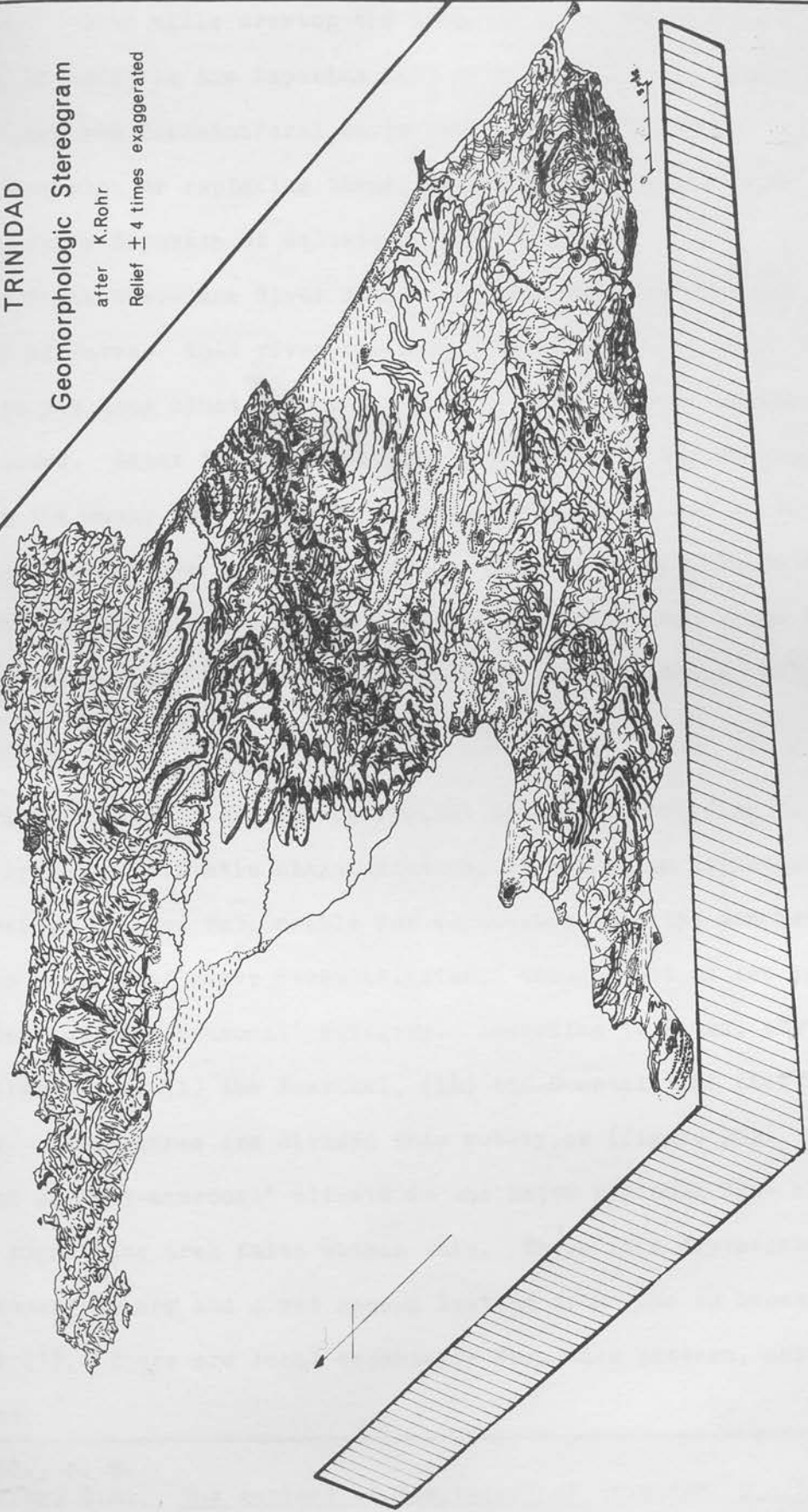


Fig. 19

cut across formations of various ages, and its stage of dissection is variable."³ Some hills overtop the lower-lying areas, the most imposing of which is the Naparima Hill (586 feet) of San Fernando. Marine clays and foraminiferal marls cover much of the west, and interbedded with or replacing these, in certain parts, are some shallow, sandy deposits of deltaic origin.⁴

The South Cropouche River drains most of the western basin into the Gulf of Paria. This river was used for transporting sugar from inland in the late nineteenth century, for which purpose it was straightened. Later it became silted, but more recently drainage works in the swamp have resulted in canalisation of parts of the river. Low hills reach above the swamp level to provide small islands of dry land, some of which are settled. Most of the sugar cane grown in Trinidad is produced in the western part of these southern Lowlands.

The climate

Trinidad lies in the inter-tropical belt and, according to the Köppen system of climatic classification, it has an Am climate. Aspect and physiography are responsible for variations locally, and Trinidad has been classified under seven climates,⁵ though most of the island is put under the 'wet-seasonal' category. According to Beard, the three main climates are (i) the Seasonal, (ii) the Coastal, and (iii) the Montane. These three are divided into sub-types (figure 20). The seasonal or 'wet-seasonal' climate is the major regional type and the entire sugar cane area falls within this. There is a dry season lasting from January to May and a wet season lasting from June to December (figure 21). There are local departures from this pattern, mainly in the east.

3. Ibid., p. 9.

4. Waring, G.A., The geology of the island of Trinidad, B.W.I., (Baltimore), John Hopkins Press, 1926, p. 25.

5. Beard, J.S., The natural vegetation of Trinidad, Oxford Forestry Memoirs, No. 20, 1946.

TRINIDAD:

Climatic Zones

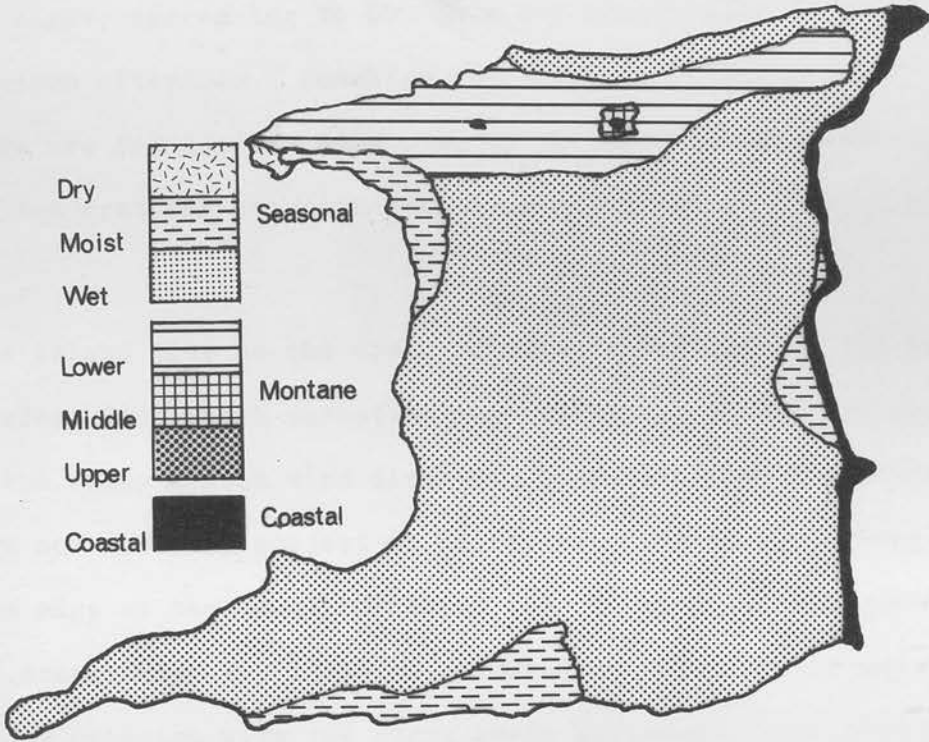
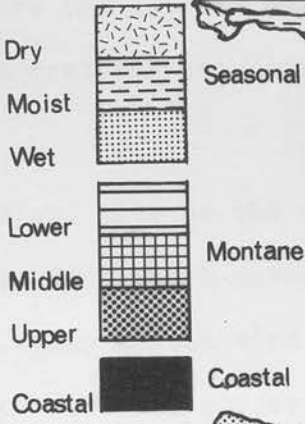


Fig. 20

Temperature

In Trinidad high air temperatures prevail throughout the year, and pose no difficulties for plant growth. The average monthly maximum temperatures have a range of about 4°F, varying between 86°F in January and 90°F in May. The average monthly minimum temperatures also show a low range between 67°F in February to 76°F in September. Over the sugar areas temperature differences are slight.

Relative humidity

Relative humidity is always high. It commonly approaches 100% at night, decreasing to 60% on a dry season afternoon and 75% on a wet season afternoon. Sunshine averages six to seven hours per day and there are few sunless days even in the wet season. With the high average temperatures, evapotranspiration rates are expectedly high.

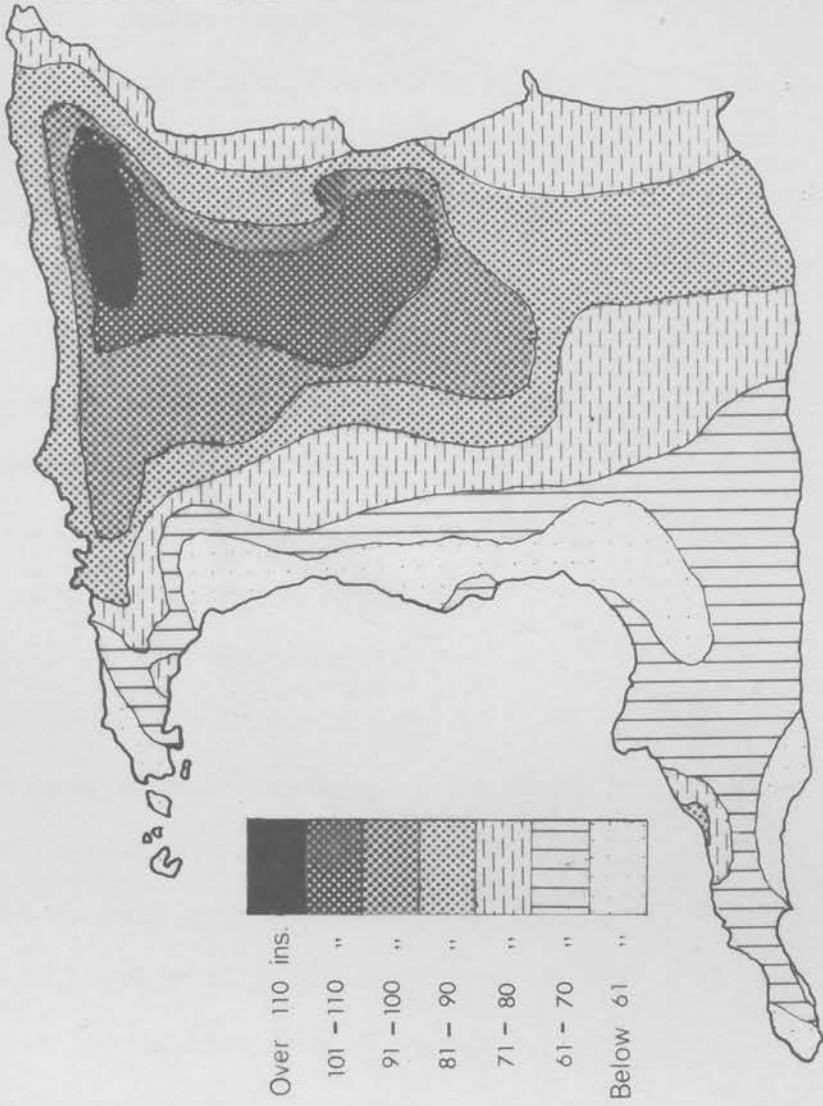
Winds

The island lies at the southern edge of the path of the North-East Trades, from which direction the winds come in the dry season. During the rainy season wind direction is mainly from the south-east. Although not normally subject to hurricanes, for it lies along the southern edge of the usual hurricane tracts, Trinidad has suffered on various occasions. The last two occurrences were in 1933 and 1963. On neither occasion were the sugar areas affected.

Rainfall

The seasonal nature of the climate derives from the periodicity of rainfall due to a shift in the winds from north-east to south-east following the transit of the sun. Maxima of rainfall are in August and November, the minima in February and October (figure 21). (This refers mainly to the western part of the island). The rainy season is interrupted by the 'petite carême', a short dry period in September and/or October. During this short dry season the drought is less intense than in the dry season proper. In various parts of the

TRINIDAD: RAINFALL DISTRIBUTION



Caroni Estates records
for ten years
Total - 60.10 ins.

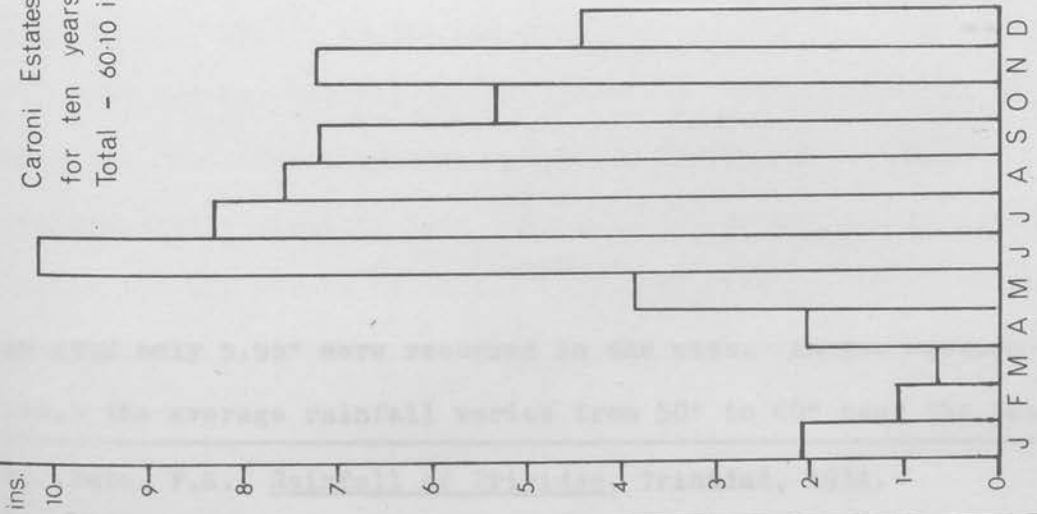


Fig. 21

sugar belt the 'petite carême' is used to advantage for quick-growing vegetables or for performing cultivation tasks in sugar cane.

Comparing rainfall over the whole island, one sees that there is a general decrease westwards (figure 21). For agriculture, however, it is not only the total annual precipitation that matters. Rainfall reliability, length of dry period, the amount of rain in the dry period and the incidence of the rain are all important. Rainfall reliability is greatest in the east. Westwards, as the annual amount of precipitation falls, so too does its reliability, and the dry season becomes longer and more intense (figure 22). For sugar cane the longer dry season makes for the concentration of sucrose and easier transport conditions especially in the fields and access roads. According to Bain,⁶ 4 inches of rain per month must be regarded as the minimum amount for normal vegetation growth in Trinidad. Most of the rain in excess of this amount is lost as run-off.⁷ In the eastern areas, only one month may fall below this figure in some years, while in the west four or five months have less than four inches of rainfall. About 10% of precipitation fall in the dry months in the west, while in the east the figure for a similar period is about 30%. The average figures tend to be misleading, for wide variation occurs from year to year in all areas. In the six-year period 1935 to 1940, figures in the east (at Mt. Harris) varied between 86.42" and 157.92", and in the west (at Port-of-Spain) between 50.93" and 90.14". Moreover, considerable variations have been recorded in dry season precipitation. During the dry season of 1951, 32.94" fell and during the same period in 1952 only 5.95" were recorded in the west. In the western sugar areas the average rainfall varies from 50" to 60" near the coast to

6. Bain, F.M., Rainfall of Trinidad, Trinidad, 1934.

7. There are, of course, a variety of complications such as the distribution of rainy days in each month, but as a generalisation a figure of 4 inches is used.

EFFECTIVE RAINFALL

(Based on Mohr's Scheme)

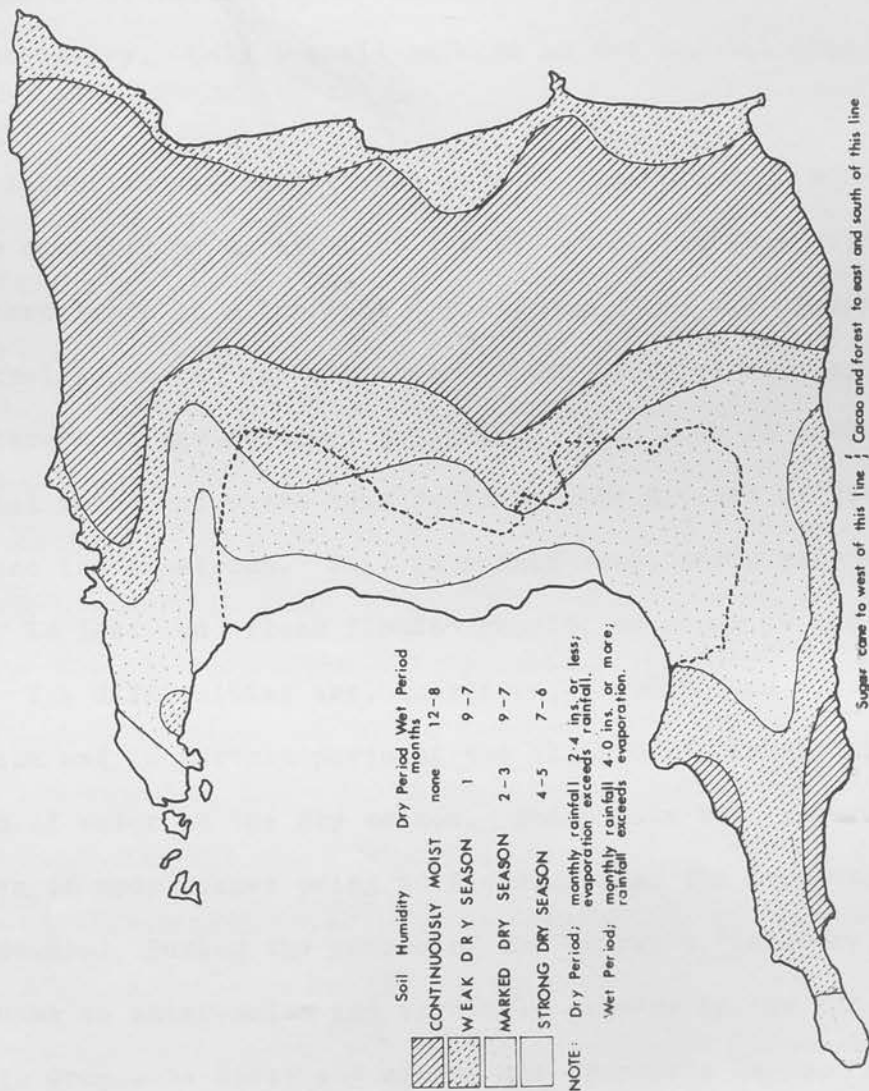


FIG. 22

70" to 80" further inland. When heavy rains fall during the dry season, the harvesting period for sugar cane, considerable difficulty is experienced in reaping the canes because fields and unsurfaced roads become impassable. Moreover, the estates cannot burn their canes and the cane stools are damaged, resulting in lower ratoon yields.⁸ An early onset of the wet season will have a similar effect, and may even cause both estates and farmers to leave some canes unharvested. Drought conditions do affect the canes on certain occasions, but irrigation is not necessary. Only a small acreage in the Bejucal area is irrigated.

Soil erosion varies with the rate of precipitation more than with the quantity or duration of the rainfall. On steep slopes in areas where there is a distinct dry season, as in the western parts of the Central Range and certain areas in the Naparima Plains, erosion is a real threat to agricultural potential. Soil loss is greatest with torrential rain, and where this falls on bare patches of steep land, the effect is disastrous. Soil is washed away, water retention capacity is lost and 'flash floods' result, as occur in the Caparo Valley. The difficulties are, therefore, flooding and erosion in the wet season and in certain parts of the sugar belt, insufficient supplies of water in the dry season. There have been several instances of crop losses owing to flooding near the Oropouche and Caroni Swamps. During the course of the writer's fieldwork, severe losses came to water-melon and vegetable growers in the floodplain of the South Oropouche River and around the Oropouche Swamp.

Soils

High temperatures and the amount and incidence of rainfall are the major factors cited in differentiating temperate from tropical soils.⁹

8. This has led to charges by cane farmers that when the estates cannot burn and reap their own canes then more adequate transport is provided for farmers' canes, so transferring costs to farmers.

9. Eyre, S.R., "Vegetation and soils" Edward Arnold, London, 1963, Chapter XIV.

Within the tropics, however, topography and drainage may be better indicators in determining differences between various types of soils.

E.M. Chenery¹⁰ classified the soils of Central Trinidad, which include most of the sugar lands, into the following main types:-

- a. Soils on flat land with slow external drainage
 - (i) Low flood plains (swamps) Elevation 3' to 25'
 - (ii) Intermediate flood plains Elevation 2' to 50'
 - (iii) High flood plains Elevation 25' to 75'
- b. Soils of undulating land with slow external drainage at elevations of 50' to 190'.
- c. Soils of hilly land with moderate to fast external drainage at elevations of 150' to 250'.
- d. Soils of steep land with very fast external drainage and at elevations of 250' to 1,000'.

This classification is based on topography and external drainage, for in Trinidad topography is considered the main factor in soil differentiation.¹¹ 'Steep land' soils within this area are widespread in the Central Range only. 'Hilly land' soils are found on low hills and the southern dissected peneplain. 'Undulating land' soils are found on detrital terraces, mainly in the north. 'Flat land' soils are found on lower terraces, drained plains and swamps. Examples of all these are found in different parts of the sugar belt and require different responses. The major response has been to drainage, and it is for this reason the cambered bed system, the modified Louisiana Bank System and the Woodford Lodge System of cultivation are used in the flat northern areas (see p. 50). They facilitate quick drainage. In the steeply and gently sloping lands contoured cultivation is used on estate owned lands as well as by some

10. Chenery, E.M., "The soils of Central Trinidad", Government Printer, Trinidad, 1954.

11. Hardy, F., "The soils of Trinidad", Unpublished script, U.W.I., "The factor which has impressed soil formation most in Trinidad is topography. Next in importance is time and next, parent rock. Climate and vegetation being almost uniform have not been prominent in differentiating soil." p. 1.

farmers. The variety of cane planted is also a partial response to soil type. Mechanisation, pests and diseases also determine the variety of cane to be planted on any particular soil. A wide variety of soil types are found and sugar cane is planted on all of them, but to a lesser extent on the Piarco and Long Stretch Fine Sands which belong to Chenery's 'undulating lands'.

These then are some of the aspects of the physical environment, the ecological framework of which provides the background to the study of its agricultural geography. Differences in soils, topography and climate make for some changes within the area, but mainly on the periphery. However large parts are sufficiently uniform to appear homogenous. Various events in the historical development of the area have also caused changes in agricultural patterns, which when examined with the environmental controls, account for the differences in land utilisation.

Land use

An understanding of the present land-use pattern in the sugar areas of Trinidad must relate to the historical development of the industry, which has already been described. From a perusal of the available literature it seems true to say¹² that the pattern of land use was basically established by the end of the last century. The pattern shown on the map (figure 17), therefore, is one that has existed for a long time in its broad outlines, and has changed only in detail. Before examining the land-use patterns within the area of the map, it is necessary to place the area in its Trinidad context, and to comment on the boundaries of the map.

12. See Harvey, D.R. op.cit.; Sammy, op.cit.; and Young Sing, G.E., The evolution of the present pattern of agricultural land use in the island of Trinidad in the West Indies, Ph.D. Thesis, unpublished, Queen's University, Belfast, 1964.

13. *Ibid.*, Publication No. 3.

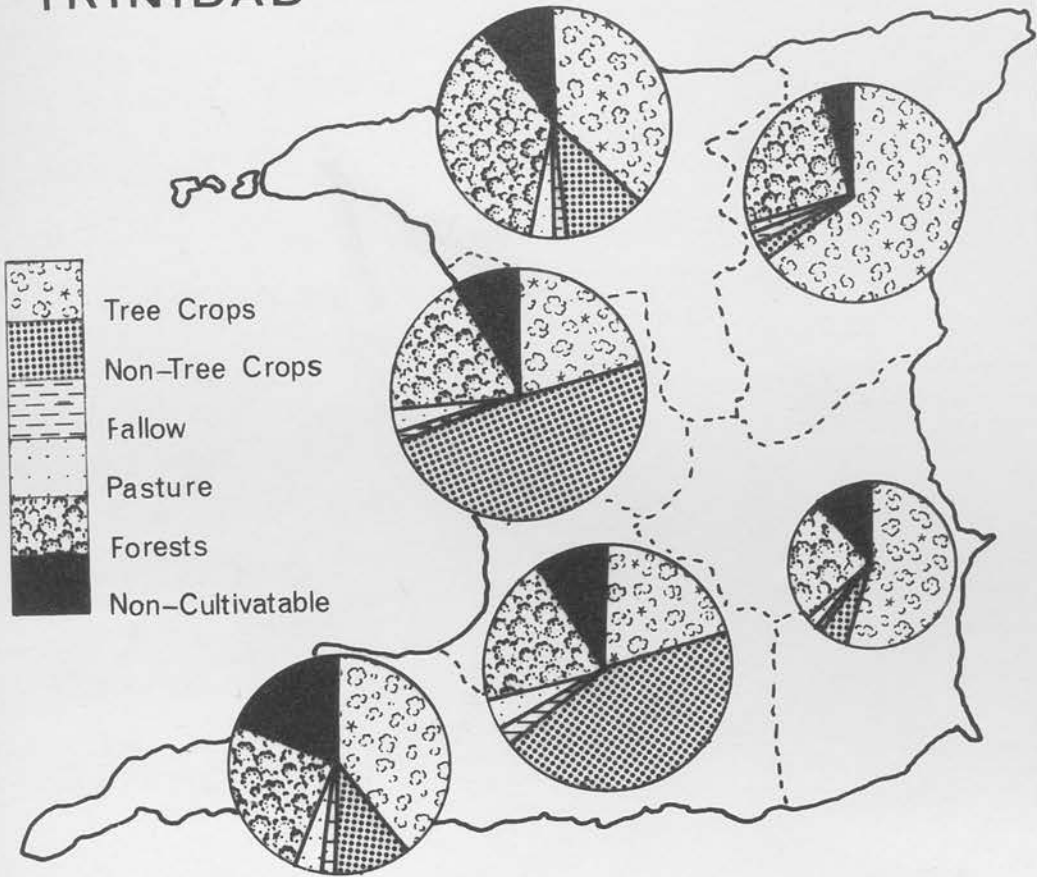
14. Harwood, J. "Estimates of internal migration and of current population distribution in Trinidad and Tobago", in Research Papers No. 3, Central Statistical Office, Port-of-Spain, Trinidad, 1967, pp. 45-75.

Trinidad¹³ has a total area of 1,192,844 acres or 1864 square miles. This map covers about 500 square miles of the western central part of the island. Global figures of land utilisation are available for Trinidad and Tobago¹⁴ (116 sq. miles) combined. They are available for the period 1946 to 1959. If figures for the utilisation of surface areas are compared for the end years 1946 and 1959 (figure 23), it is seen that the major change was an increase in the area under cultivation, compensated by a decline in the areas under semi-derelict crops. Another survey¹⁵ which so far has produced results which relate only to "holdings of one or more acres, excluding Government holdings",¹⁶ shows a more recent, but restricted picture of land utilisation (figure 24). It presents only some aspects, which show clearly that most of the non-tree crop agriculture is practised in the two counties, Caroni and Victoria, which form the greater part of the map. Most of this non-tree crop agriculture is sugar cane. The eastern counties are mainly under tree crops and forest.

A map of population density (figure 25) also shows the western areas to be more densely settled than the east. There are two densely settled parts of the island that do not fall within the boundary of the map. These are between Laventille and Diego Martin (includes Port-of-Spain) and the Point Fortin area of St. Patrick County. Rural-urban drift has been known to exist but no exact measurements are available as to the extent of this. A map produced in a recent official study¹⁷ (figure 26) shows that the two most urbanised counties of St. George and Victoria, have been increasing their populations at a faster rate than the rural counties.

-
13. This excludes Tobago.
 14. For land use in Tobago, see Niddrie, D.L., Land use and population in Tobago, 1961, World Land Use Survey, Monograph 3.
 15. Trinidad Agricultural Census, 1963.
 16. Ibid. Publication No. 3.
 17. Harewood, J. "Estimates of internal migration and of current population distribution in Trinidad and Tobago", in Research Papers No. 3, Central Statistical Office, Port-of-Spain, Trinidad, 1967, pp. 45-75.

TRINIDAD



Land Utilisation by Counties 1963

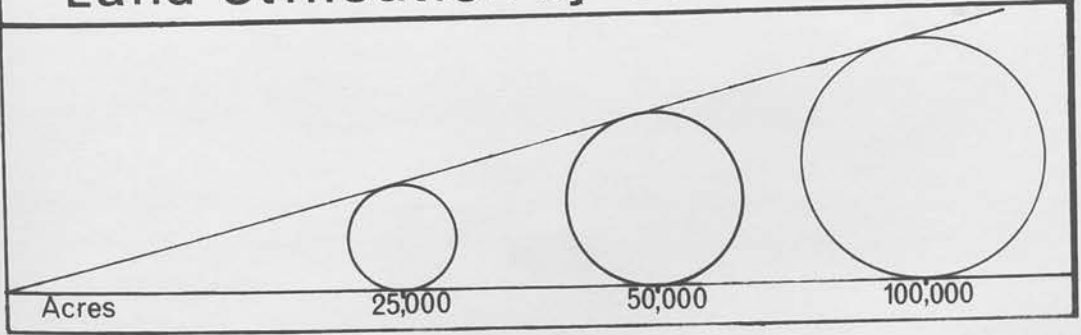





Fig. 24

POPULATION PER SQUARE MILE BY WARDS, 1965

TRINIDAD

751 & over	
201 - 750	
0 - 200	

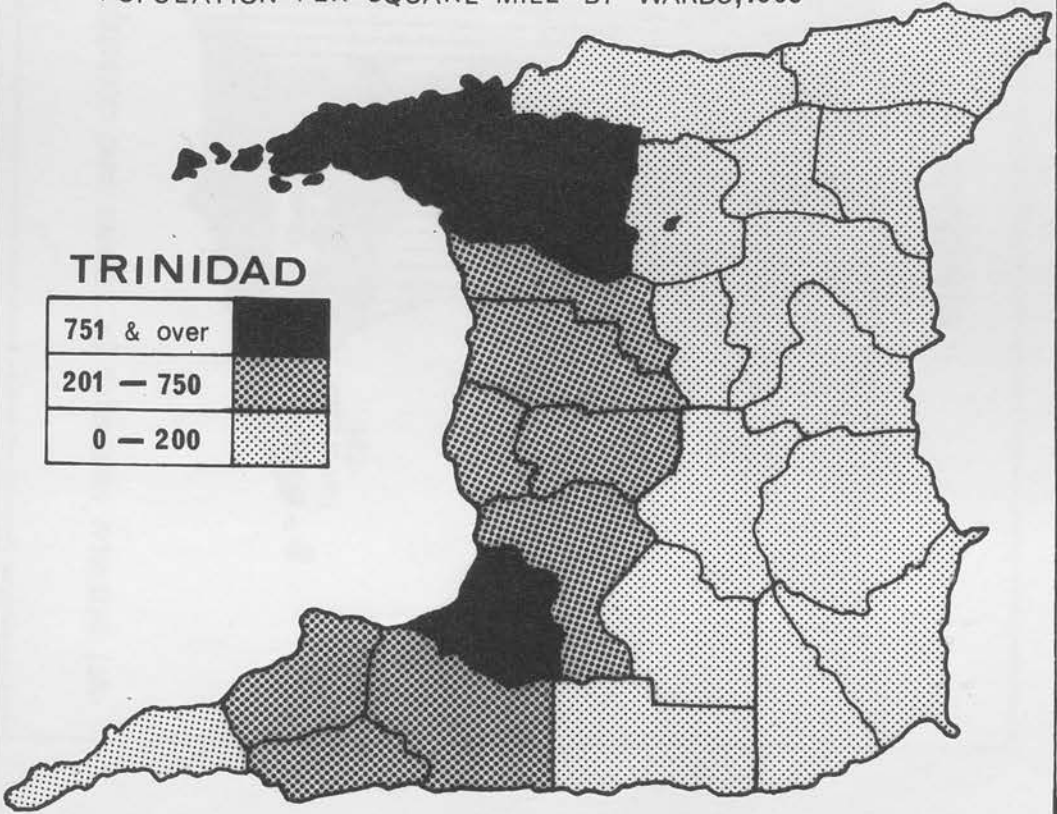
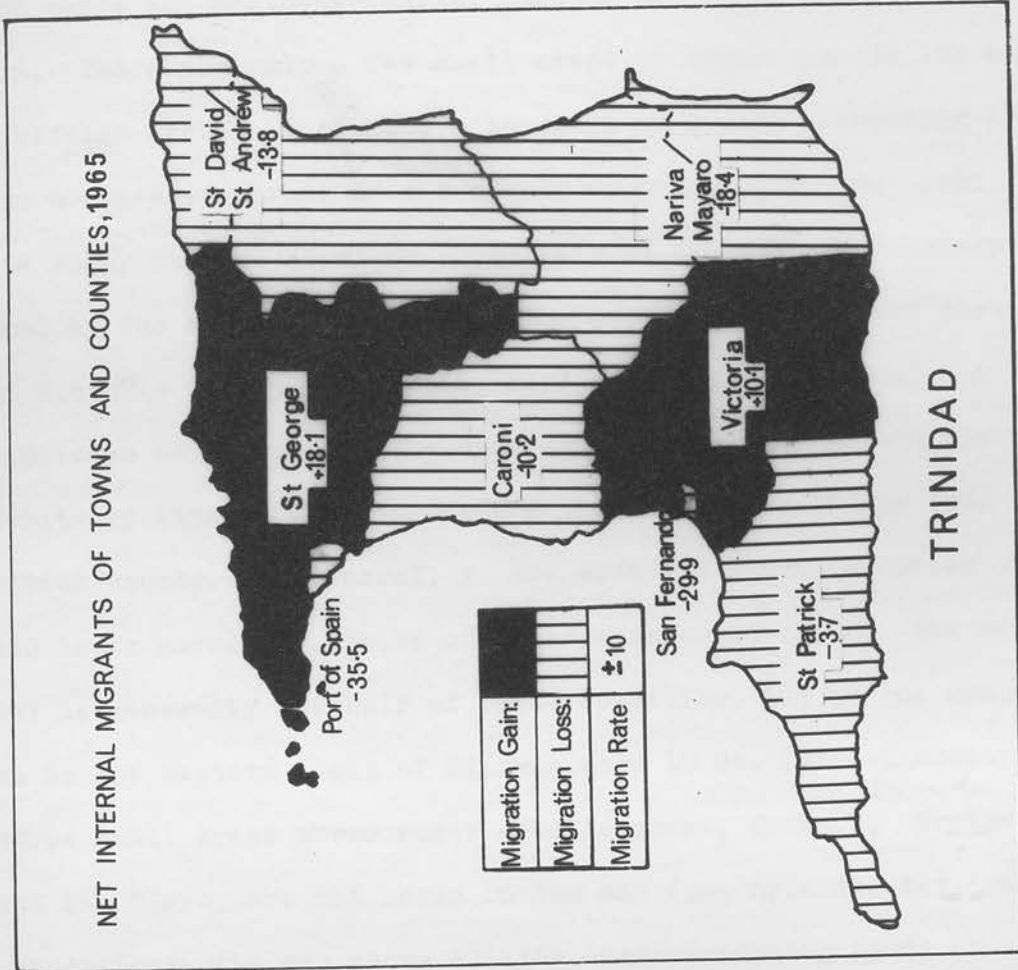


Fig. 25

NET INTERNAL MIGRANTS OF TOWNS AND COUNTIES, 1965



TRINIDAD

Fig. 26

The boundaries of the land-use map

The purpose of the map is to portray the land-use patterns of the sugar producing areas (figure 17). Its boundaries were, therefore, chosen with this in mind. The northern boundary, in the county of St. George, is arbitrary. Effectively, it is the urbanised area between San Juan and Arima, beyond which rise the mountains of the northern Range and north-westwards, part of the built-up belt to Port-of-Spain. There are only a few small areas of sugar cane to the north of the settled strip. The eastern boundary is a line connecting Arima with the north-east corner of the county of Caroni. Further east, there is sugar cane at Guanapo. The rest of the eastern boundary is formed by the eastern borders of the county of Caroni and part of that of Victoria County, continuing more smoothly southwards in a line which includes nearly all of the sugar producing lands within the map. This arbitrary line is continued along the southern boundary into St. Patrick county. In general, to the east and south, a border of forested lands marks the limits of sugar cane cultivation. The western boundary is generally the Gulf of Paria coastline, but in the southern stretch is the western limit of Siparia ward in St. Patrick County. Only three small areas where sugar cane is grown, Guanapo, Brother's Road and Rio Claro, are not shown on the map (see Appendix II). With these exceptions, the map shows all the sugar producing lands of Trinidad.

The land use classification

The classification used is intended to show relations between sugar cane and other classes of land use (see Appendix II). It is not identical with those used either in the Agricultural Census of 1946, or in that of 1963. It includes all forms of land use, but emphasises agricultural land use and, within agriculture, that of sugar cane.

Within the main areas of sugar cane, the tree crops, citrus and coconuts, are shown separately. Within the broad forested belt, citrus is shown separately, but because there are only small coconut groves within this area and they were difficult to distinguish on the air photographs, coconuts are shown, here, together with other tree crops and forest. The areas shown as 'forest and other tree crops' are covered mainly by forest and cocoa trees, some of which are derelict or semi-derelict. Pasture and scrub are taken as one class (see Appendix II). All cleared land is shown together, whether it is to be used for agricultural or non-agricultural purposes. Not all classes which are shown separately on the map are discussed separately in the text.

The land-use classes

Forest and tree crops and forest with open clearings (figure 27).

Forest still covers about 40% of Trinidad, mainly in the mountain ranges ¹⁸(figure 23). When the island was discovered by Columbus at the end of the fifteenth century, it was almost completely covered by forest. The Northern Range was covered with a four-tiered rain forest on the highland, flanked to the north and south by evergreen seasonal forest. The evergreen seasonal forest covered most of the rest of the island, except the swamps. The areas shown in the map (figure 17), were all covered by this seasonal evergreen forest of characteristic four-tier structure. ¹⁹ Only small patches of this original cover now survive. In the remainder of the forested lands which were not brought under non-tree crop agriculture, either cocoa and other tree crops were planted, or small patches were cleared to produce food crops. Much of what is shown as forest is secondary growth.

18. Annual Statistical Digest, 1967, table 106, p.97.

19. Beard, op.cit.

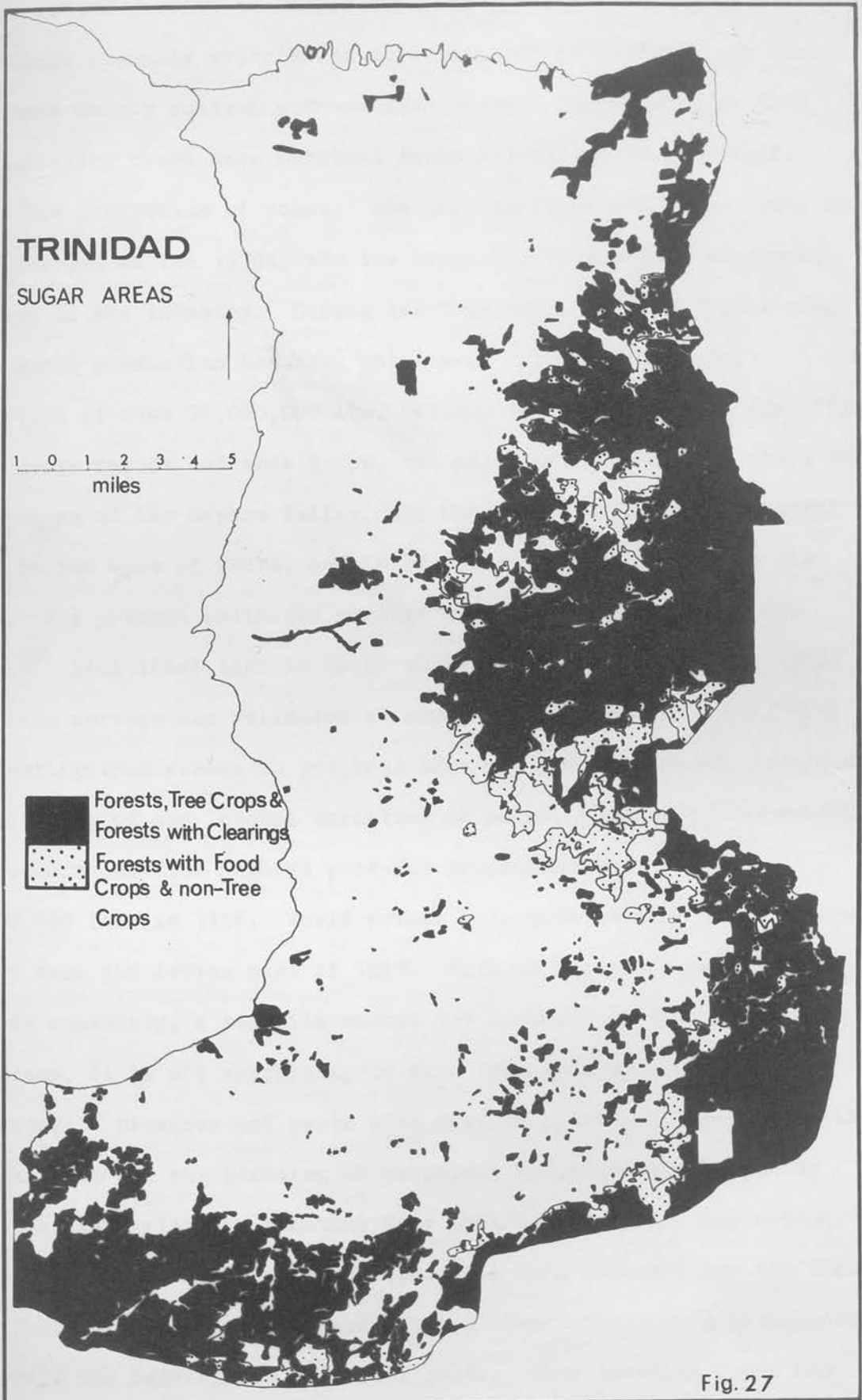


Fig. 27

During the latter part of the last century and the early decades of the present century, cocoa was planted extensively over wide areas which normally experienced more than 70" of rainfall per annum. These were mainly eastern and southern areas. Large acreages that were put under cocoa were marginal lands not suited to prolonged, profitable production of cocoa. The fall in cocoa prices in 1921, which was continued in the 1930s, was the beginning of a period of general distress in the industry. During the four years up to and including 1967, cocoa production has been only about one-seventh of 1921 production of over 75,000,000 lbs. Within the areas of this map (figure 17) shown under forest and tree crops, the major cocoa producing areas are the slopes of the Caparo Valley, the Montserrat area in the Central Range to the east of Couva, and in the areas around Siparia in the south. The present estimated acreage under cocoa is about 80,000 acres.²⁰ Additional land is under abandoned cocoa, for in the 1920s the cocoa acreage was estimated at about 250,000 acres.²¹ Even with a rehabilitation scheme in progress over the post-war years, involving the planting of new clonal varieties of cocoa, there has been continued low production. The highest post-war production was just under 22,000,000 lbs. in 1956. World prices have given little encouragement except from the latter part of 1967. With no international agreement on this commodity, a volatile market and competition from larger producers, it is not surprising to find that this crop is no longer attractive. Diseases and pests also provide problems. Spraying with insecticides and the planting of resistant varieties are producing mixed results, with the constant fear that new varieties may endanger the prized flavour of Trinidad cocoa. The main diseases are the Black Pod (*Phytophthora palmivora*) and Witches' Broom (*Marasmius perniciosus*). Squirrels and Bachacs are difficult pests. Some derelict cocoa has

20. Draft third five-year development plan, p. 272.

21. Moll, E.R., Cocoa in Trinidad, Port-of-Spain, 1960, p.1.

been cleared and the land put under citrus and coffee. However, although no figures are available, there are still large acreages under semi-derelict or abandoned cocoa. Agronomic, physical and economic causes can thus be cited as being responsible for the contraction of the cocoa lands.

Much of the cocoa is not in pure stands. Generally it is interplanted with coffee. There are about 7,000 acres²² of coffee in the entire country. This crop is more attractive now because, surprisingly, the International Coffee Agreement favours its production. The production quota allocated to Trinidad under the agreement has not as yet been reached, and even now a further, increased quota has been allocated for Trinidad coffee. Other crops that are interplanted with cocoa are citrus and bananas. Bananas are specially important for cocoa producers because they are used to provide shade for the young cocoa plants. This crop produces a saleable product while the cocoa trees are still immature. Moreover, banana production is not restricted to any season and, therefore, provides some money all the year round.

The other tree crops that are grown in these areas shown under forest and other tree crops, are tonca beans and cashew. Tonca beans are used in flavouring and perfume manufacture, but there is little demand for them. This crop occupies small acreages in the cocoa areas, and in addition there are trees interplanted with cocoa. Cashew is grown on sandy soils such as the Piarco Fine Sands, the Long Stretch Fine Sands to the south of Arima, and in the Las Lomas, Ravine Sable and Chickland areas. Formerly used for subsistence purposes only (may be regarded as a luxury subsistence crop), cashew is now providing the

22. Edwards, D.T. "Some statistical tables on West Indian Agriculture", 1962, quoted from Caroni Limited, Quarterly Bulletin, Sugar and the Land, November 1967, Appendix 1.

basis for a small internal trade. The nuts are prepared and sold locally. Some prepared nuts are also imported.

The areas of forest that have survived have done so partly because they are on inaccessible interfluvial ridges of the Central Range, and partly because much of the high ground is owned and protected by the State. Large tracts of forest in the Central Range, namely the Longdenville, the McNair and Basin Hill reserves, and large acreages to the east of Tabaquite belong to the State. Over the whole country, more than 500,000 acres²³ of various types of forested lands are owned by the State. Relatively little forested land is privately owned (c. 30,000 acres).

As far as their utilisation is concerned, the State forests are used both for the protection of watershed areas and for production purposes. Guatacare is used for heavier tasks such as bridge construction. A relatively new introduction for production purposes is teak. Production of this has more than doubled between 1958 and 1967, in which years 61.2 and 126.1 thousand cubic feet were extracted from State forests. It still lies fourth after Mora, Crappo and Olivier in volume of production, but while teak production is increasing that of Crappo and Olivier has decreased considerably during the 1960s (see Appendix III, table 5). Another recent introduction of importance is the Honduran Pine.

In the southern forested areas, especially in the west, but to a smaller extent in the east, there are large tracts which show a pattern of clumps of trees separated by open clearings. These open clearings in the forest are not used for agricultural purposes, but mark drilling sites in the producing oilfields.

A few patches of flat to undulating land, and also some very

23. Trinidad and Tobago, Annual Statistical Digest, 1967, table 106, p. 97.

steep land, within this forested zone have been planted in sugar cane. Such land is found in the Caparo valley, around Tabaquite and in the Chickland area of the Central Range. Generally, the peasant farmers in these forested areas do not depend entirely on sugar cane (p.205). The farmers are usually small to medium-sized cane producers who supplement their earnings, either by working as wage earners on the cocoa estates, or by cultivating small acreages of tree crops themselves. This is especially true of Todd's Road, Caparo, Brother's Road and Rio Claro. The western edges of the forested zone are being nibbled at by sugar cane growers, mainly the estates.

Generally, it can be said that all the forests and tree crops described, are in the east and south. The areas covered are wetter than those to the west. Topography varies from slightly to steeply sloping. Only in restricted areas are flat lands in western Trinidad under this class. Small areas have been cleared to make way for land settlements or for sugar cane. Nevertheless, it is true to say that these lands, because of climate, topography and inaccessibility, all related factors here, will be difficult to bring under widespread sugar cane cultivation.

Forests with food crops and other crops (figure 27).

Within the area described above, consisting of the forested zone to the east and south, some land is used under land rotation methods. The two main areas are the flanks of the Central Range, especially the sides of the Caparo valley, and the areas west and south of Tabaquite. The northern side of the Southern Range and the western parts of the Northern Range are other areas that are outside this map which experience this type of land occupation. The broken relief and marginal

nature of the land, and insecure tenancy produce widespread evidence of gullying and soil slip. Some of these lands were abandoned cocoa estates and are used to produce both subsistence and cash crops.

In the open patches of ground in the forest, crops of ground provisions (the local name for root crops) and vegetables are grown. The cropping pattern is normally one in which the land is cleared and burnt by the end of the dry season. The felled trees are used to make charcoal, but this is becoming rare owing to lack of demand for charcoal and also the lack of trees of adequate girth. As in other areas of shifting cultivation in Trinidad, such as in the Northern Range, digging and planting operations take place between May and July, depending on the onset of the rains. Clearing is generally done with paid help, but the less strenuous tasks of planting and cultivation are performed by the holder and his family. A variety of crops is grown, including maize, pigeon peas, root crops such as tannias, cassava and yams, and bananas, pumpkins, and vegetables such as cucumbers and tomatoes. The crops are generally intermingled, but some cultivators may devote plots to single crops.

Some of these crops are commercialised and find markets in the sugar belt towns of Chaguanas, Couva and Princes Town. Cultivators growing tomatoes are generally well-placed because the main tomato producing area in Aranjuez is low-lying and suffers from drainage problems in the wet season, a problem that does not affect cultivators on sloping ground. When their crops of tomatoes are ready for market, therefore, prices are high owing to scarcity. Other crops that are commercialised are maize, bananas, some root crops and pigeon peas. For some of these guaranteed prices are offered by Government (see Appendix III, table 6). Cropping may be repeated for two, three or four years on the same plot until either returns are too low or the

cultivator is asked to leave the plot.

Recently, tobacco has been introduced to these areas. Encouragement for this crop came from a local cigarette manufacturer²⁴ and from Government. This crop is attractive because buying facilities are provided by the firm. Contractual obligations are accepted by farmers and the firm, with substantially greater benefit being obtained than from sugar cane. Until now, the crop has been restricted to sandy loams in the northern forested areas of this map. Las Lomas and the Thompson Trace area of the Caparo valley are the most important localities. Credit, drying facilities and expert advice, are provided by the firm.

There are certain characteristics which make tobacco different from other crops put under this class. The crop is wholly commercial. Further, because the growers are under contract if they are to be provided with credit facilities, those chosen to grow this crop are usually the more enterprising farmers who generally have secure tenure. The land on which the crop is grown is chosen by the staff of the firm in order to ensure that soil and climatic requirements are suitable. Fertilisers and bottled gas for drying the tobacco leaves are provided, to be paid for when the crop is sold. Net returns are about \$600.00 TT per acre.²⁵ It is, therefore, a crop that produces a higher net income per acre than sugar cane (table 27) and it occupies the land for only four months. Food crops such as maize, root crops and vegetables are grown on the same plots for the rest of the year. This is generally for commercial purposes and supplements income. Again, the education of the farmers benefits. On sloping ground the farmers are taught soil conservation methods. Farmers are made to keep accounts of receipts and expenditures, which they may have never attempted. This crop, too, is intensively grown and, because of this

24. The West Indian Tobacco Company Ltd.

25. Draft third five-year development plan, p.278.

and the fact that it generates a high income, employment opportunities are expanded. The diversification that this crop introduces, the educational, financial and employment opportunities provided, are most welcome by farmers. If nematode infestation can be prevented, expansion seems desirable.

Citrus and coconuts (included in figure 27)

The growing of citrus fruit was encouraged as a substitute for cocoa earlier in this century. At present, high costs and severe competition on the international market affect production. There is a local market for fresh fruit, and a co-operative plant processes most of the fruit destined for export, although some of the processed fruit is consumed locally. There are relatively small acreages of citrus within the densely settled sugar areas, because here the crop is affected by praedial larceny²⁶ and suffers contraction because land is taken for housing purposes. Citrus fruit is easily disposable and so suffers immensely from the problem of praedial larceny, a problem which also affects food crops. Pests and diseases provide further problems. In spite of the aforementioned difficulties, the government has encouraged production of citrus crops and intends using some State-owned lands for expansion²⁷. The main citrus products are grapefruit, oranges and limes.

The total coconut acreage of the country has been estimated at between 25,000 and 30,000 acres.²⁸ Most of this is in the east coast area and in the Cedros peninsula. Production cannot now supply all local needs of copra and imports come from other Caribbean territories. Production has declined mainly owing to the effects of the Red Ring disease which has reduced the tree population. Within the area

26. Larceny related to agriculture.

27. Draft third five-year development plan, p. 275.

28. Ibid, p. 276.

of this map there is a relatively small acreage of coconuts, at the northern edge of the Caroni Swamp south of San Juan, near Arouca, Chaguanas, parts of the Caparo Valley and to the south of San Fernando. In these areas, the effect of Red Ring is not the only cause of a reduction in the tree population. As with citrus, coconut lands are also being used for building purposes. This is especially true near San Juan, Arouca and to the south of San Fernando. Copra production in these areas is further reduced because of the demand for fresh nuts in the towns. Near the built-up areas, it is probable that this crop will continue to decline. A crop, such as coconuts, producing a low income per acre cannot retain its place on valuable real estate property located near the town.

It is worth noting that only a few cane farmers have sizeable coconut or citrus acreages. Those who do have are generally the larger farmers, and these are few. Citrus and coconuts are tree crops which require a secure tenure, and this only the larger farmers can afford. Generally, production of coconuts is organised in medium to large holdings, and citrus in small, medium or large holdings. All rural house plots and even some in the urban areas may have a few citrus or coconut trees, but this is only for domestic use.

Cleared land (figure 28).

In this western part of Trinidad, cleared land is found mainly near the built-up areas, or at the edge of the forest zone. Near the built-up areas land has been cleared for the expansion of industry and settlement. Some land which is still under cane is scheduled for housing and industry in the north where the Trincity project has already started. Near Arima, Chaguanas, Couva and San Fernando, land is being taken over. On the edge of the forested zone there are a few large patches of cleared land and several small ones (figures 17 &

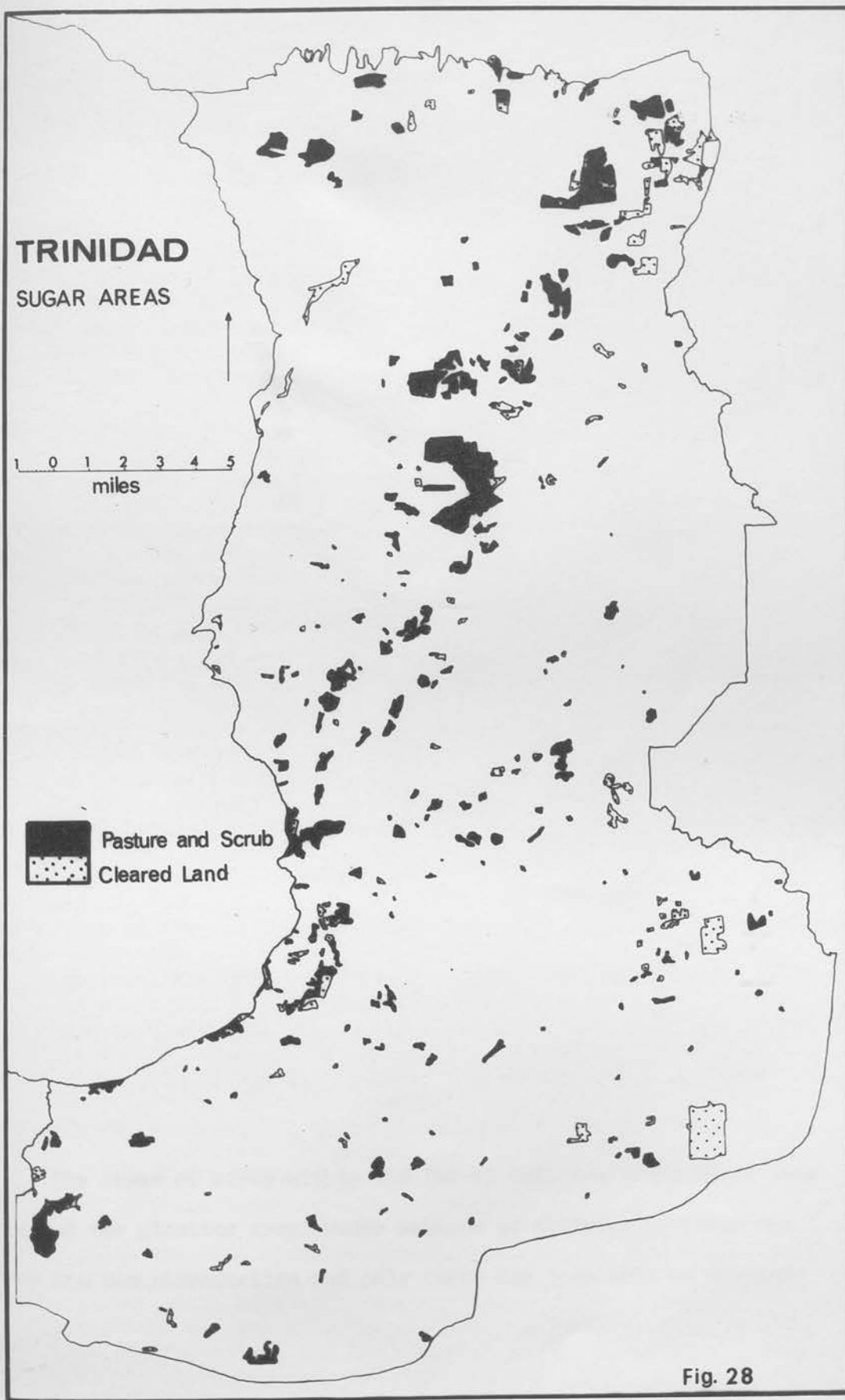


Fig. 28

28). Most of these have been cleared for agricultural purposes, mainly for sugar cane and pasture. Some parts of the Central Range which are shown under this class have bare patches of eroded land. Land cleared for quarrying is also shown in this category, e.g. Cleared land shown in San Fernando, on the Naparima Hill, was forested and is now used for quarrying.

Thin strips of cleared land are shown along the eastern edge of the Caroni Swamp, near to Felicity. Mangrove trees have been cleared and the wood used for firewood. These strips may be drained and used for rice production. Cleared land that exists in small plots cannot be shown separately. These plots are usually for building purposes and are within the settled areas. They have been included in the settled areas on the map.

Pasture and scrub (figure 28)

In compiling this map, there was great difficulty in distinguishing between land that is used as pasture and land that is true scrub.

A relatively small acreage is under planted grasses and this belongs to a sugar estate, an oil company, the University of the West Indies and Government agricultural establishments. Few individual farmers have plots of planted grasses. Both scrub and pasture, whether planted or unimproved, are used for grazing animals. The animals are either left to graze if the fields are enclosed, or are tethered if the fields are open. Generally, there is a divorce between livestock and sugar cane agriculture, except for draught purposes (see p.208).

The areas of scrub within the forest belt are lands which were cleared for planting crops under methods of shifting cultivation. They are now unproductive and only scrub has been able to develop.

These are not usually used for pasture. There is one large livestock farm near Flanagin Town in the Caparo valley, and this land is under improved pasture and planted grasses. Large patches of scrub exist between Piarcó and Arima. Most of this is on the Piarcó Fine Sands which cannot easily be converted to agricultural uses. The vegetation is a covering of sparse grasses and cocorite palms. Two other areas are shown under this class. These are to the north of the Caroni Swamp and the Chaguanas-Longdenville-Carlsen Field area. The area to the north of the swamp is covered by swamp reeds. This area is sometimes used by Aranjuez vegetable farmers for grazing livestock. At various times in the past, it was also used for rice cultivation. The area near Chaguanas (to the east and south-east) was partly under sugar cane recently. The section north of Montrose is mainly on Washington Loams which can produce good yields of sugar cane. However, it also suffers from dessication. This section is under the ownership of a single individual, who has been able to regain the land which was formerly rented to tenant farmers. Because of low sugar cane prices, farmers were not very unwilling to leave their plots. Some of this land has been cleared for building purposes. Further east and to the north of Longdenville, poor soils exist on which there are a few groves of cashew trees, but such soils can support little more than scrub. The largest area of scrub on the map is at Carlsen field. This was an United States air base during World War II, but has now reverted to the Trinidad Government, which has utilised part of it for a land settlement. Until 1967, the western part was used by peasant cane farmers for growing sugar cane and vegetables. It is part of this section which has been used for the land settlement and, consequently,

29. Chenery, op.cit., says that "cultivation of these soils has proved extremely difficult on account of unfavourable water relationships." P.25.

30. Ibid. P.26, describing the Long Stretch Sands, Chenery says, "The whole profile is extremely acid (pH 3.8-4.0) and devoid of plant nutrients, which combined with unfavourable water relationships, makes these soils completely useless for agriculture."

led to the eviction of some farmers. Others were more fortunate for they were allocated 20-acre farms on the project. Most of the disused air base, however, is still under scrub, but the projected expansion of the land settlement will bring a larger acreage under productive use. This area, too, consists of poor soils of the Long Stretch Series. Further south, near the Brechin Castle mill, is the pasture of planted grasses owned by the sugar estate.

Swamps and water (figure 29)

There are two large areas of swamp, the Caroni Swamp and the Oropouche Lagoon (swamp). These are both mangrove swamps, and are used for the extraction of mangrove wood and the fishing of edible oysters. Parts of both have been drained by one of the sugar estates and by government. Part of the Caroni Swamp is a nature reserve for the scarlet ibis and, as such, is a tourist attraction, providing employment for a few boat owners. On the fringes of both swamps, where agriculture is practised, this is done so at great risk, for flooding frequently destroys crops. Near the Oropouche Swamp this has occurred frequently in recent years. Impregnation by salt water is a further problem. In addition to these two large areas of swamp, there is a narrow belt of swamp along the coast of the Gulf of Paria.

The water bodies within this map area are quite small and are either reservoirs for supplying potable water to the population, or privately owned by the oil companies or the sugar estates for industrial uses. Some bodies of water which were too small to be shown at the scale of the map have been included in the built-up areas.

Rice (figure 29)

Over the island as a whole rice is grown on an estimated 10,000 to 15,000 acres,³¹ most of it being lowland rice, usually

31. Draft third five-year development plan, p. 278.

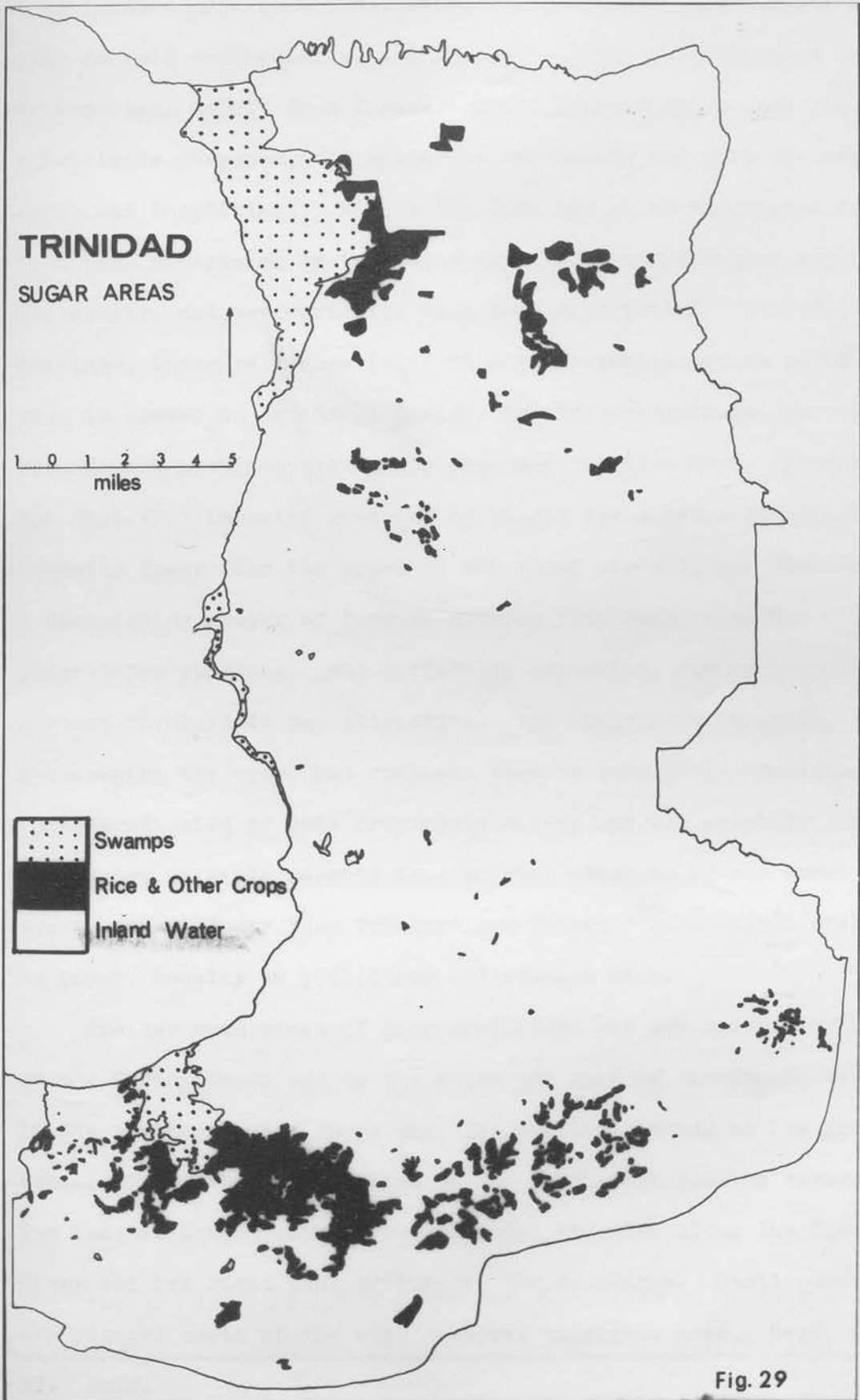


Fig. 29

grown in small plots of less than an acre. As will be shown, many cane farmers grow rice for subsistence purposes. Very little of the crop is sold commercially, and over 80% of the rice consumed has to be imported, mainly from Guyana. Because the crop is used for subsistence purposes, the mills for processing the crop are very small and inefficient. Within the last few years fertiliser trials have been undertaken by the local fertiliser manufacturer and the University, and new varieties have been distributed. However, small acreages, insecure tenure (rice is more frequently grown on land that is rented on an annual basis), traditional methods and low returns are problems preventing expansion of this crop. Moreover, the fact that imported rice can be bought for reasonable prices (usually lower than the price of the local product) has resulted in a diminishing number of farmers growing this crop, even for subsistence purposes. The difficult, expensive, labour-intensive process involved is not attractive. The Government is still encouraging the crop, but realises that "a reasonable increase in local production of this crop would not in any way preclude continuing sizeable imports from Guyana, which is in any event a lower cost producer than Trinidad and Tobago."³² A little hill rice is grown, usually as a shifting cultivation crop.

The two main areas of rice production are the eastern fringes of the Caroni Swamp and to the south and east of the Oropouche Lagoon. In the northern areas there are also smaller patches on low ground, especially in the flood plains of the north-west flowing rivers of the Central Range, such as the Cunupia, and also along the Caroni River and its right bank tributary, the Tacarigua. Small quantities are planted south of the main Aranjuez vegetable area. Here, as in

32. Ibid.

other areas, growing this crop is risky owing to flooding, it produces low returns or is used only for subsistence purposes, so that with higher incomes from vegetables, the acreage devoted has diminished considerably. In Aranjuez, on a limited acreage, rice is grown in the wet season and vegetables in the dry season.

There is a small rice producing area to the west of Carlsen Field in the low-lying ground of the Chandernagore and Cuesa Rivers. Here, too, the acreage under rice is decreasing.

The other important area is that to the south and east of the Oropouche Lagoon, in a location similar to the lands east of the Caroni. Some rice land is along the upper reaches of the South Oropouche River, which flows through the swamp, and its tributaries such as the Cumuto.

Over all the areas on which rice is grown, cropping follows one of two patterns. Some of the lands are used only for rice and thus are in productive use only during the wet season, and remain fallow during the dry season. Dessication may prevent the planting of another crop. The remainder of the rice lands are cropped also in the dry season, producing vegetables and root crops in the northern areas, and vegetables and pulses in the southern areas.

Sugar cane and rice (figures 29 & 31)

In both the major rice producing areas there are patches of land where both crops share an equal proportion of the acreage. Formerly, these areas produced only rice, but with the post-war expansion of sugar cane cultivation, they were partially taken over by sugar cane. The crops occupy different parcels of land. Sugar cane occupies the land the whole year, but rice takes up only four months. During the dry season the rice lands can be used for other crops, usually vegetables and leguminous crops, but also root crops.

Such areas show a lesser dependence on sugar cane in a manner similar to Rio Claro and the Caparo Valley, where tree crops release farmers from complete dependence on sugar cane. In these areas there is usually a combination of sugar cane on one plot and rice and vegetables and/or root crops and/or pulses on another plot. It is by no means a system in which crop rotation is practised purposefully, but it does benefit to a certain degree from crop rotation. Further, it lessens the problem of seasonal unemployment. The major areas are Bejucal-Charlieville³³ in the north, and Penal-Debe in the south.³⁴ The lesser dependence on sugar cane is reflected in the larger numbers of small and medium sized sugar cane producers (figure 13), and the generally lower average production per farmer in these areas (figure 12).

Other crops (figure 30)

This class covers a variety of crops, but of major importance are vegetables such as tomatoes, cabbages, egg plant, cucumbers and other market garden products. Pumpkins, maize, pigeon peas and root crops also fall in this category. It is obvious, therefore, that the crops grown in the forest clearings under a system of shifting cultivation are also grown in the areas shown under this class. The difference is that there is a greater permanency of productive utilisation in these areas as compared to the plots under shifting cultivation, although not every plot of land in this class is used to grow crops throughout each year; over some parts crops may be grown only in the dry season, or only in the wet season. Patches of scrub or fallow land are interspersed within these areas.

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33. For a description of farming here see Jolly, A.L., "Peasant farming in the Bejucal area of Trinidad", Tropical Agriculture, Vol. 22 No. 5.
34. For a description of farming here see Jolly, A.L., "Peasant farming in two districts of the Oropouche Lagoon, June 1944-45", Tropical Agriculture, Vol. 25 Nos. 1-12.

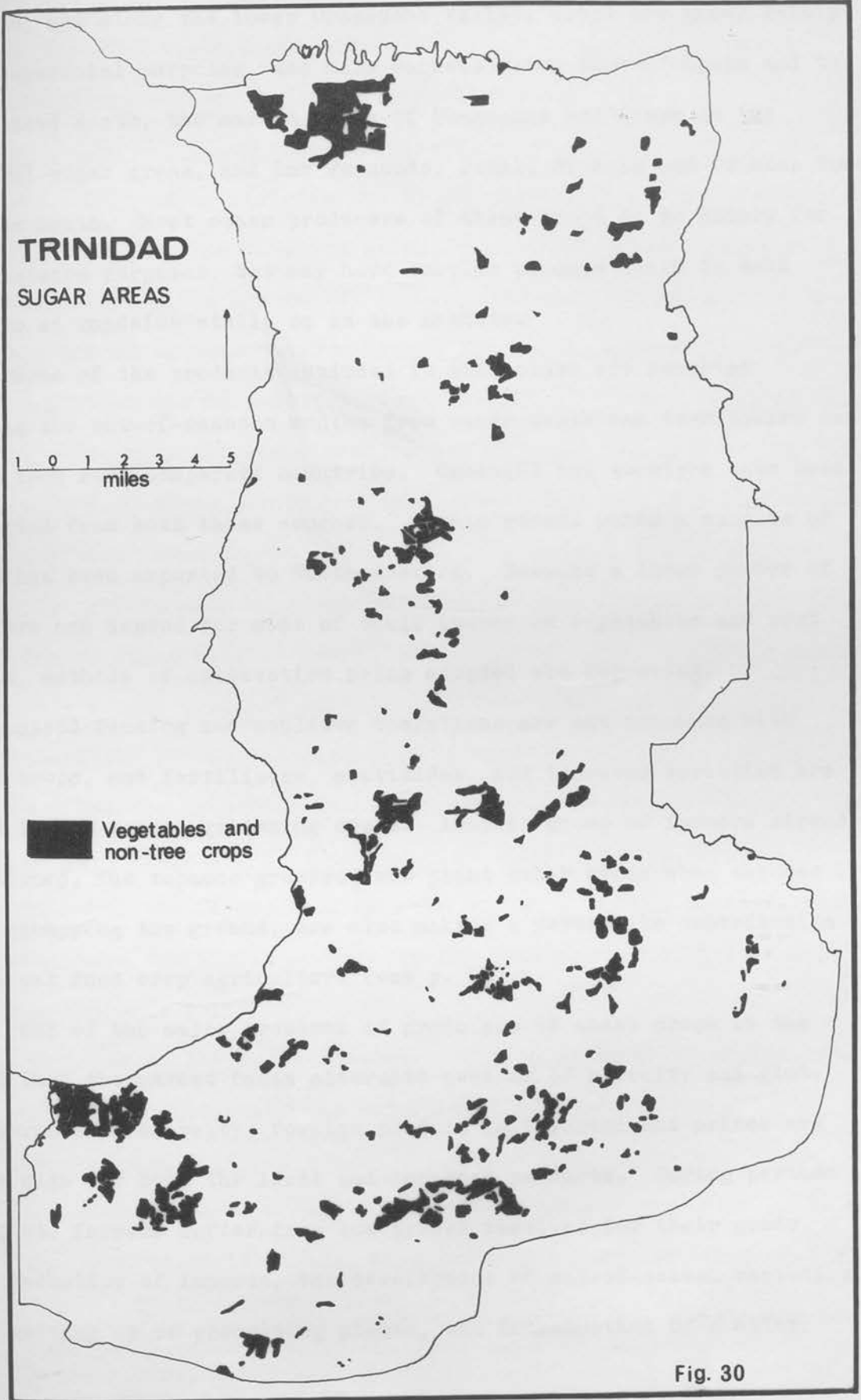


Fig. 30

In some parts, notably the areas to the south of San Juan, at McBean, and along the lower Oropouche Valley, crops are grown mainly for commercial purposes, the main markets being Port-of-Spain and the urbanised north, the market towns of Chaguanas and Couva in the central sugar areas, and San Fernando, Penal, Siparia and Princes Town in the south. Most other producers of these crops do so mainly for subsistence purposes, but may have surplus produce which is sold either at roadside stalls or in the markets.

Some of the products included in this class are imported during the out-of-season months from other Caribbean territories and even from some temperate countries. Cabbages and tomatoes have been imported from both these sources. Within recent years a surplus of yams has been exported to North America. Because a large number of farmers now depend for most of their income on vegetables and root crops, methods of cultivation being adopted are improving.

Mechanised banking and moulding operations are not uncommon with root crops, and fertilisers, pesticides, and improved varieties are used in the market-gardening areas. Another group of farmers already mentioned, the tobacco growers, who plant other crops when tobacco is not occupying the ground, are also making a worthwhile contribution to local food crop agriculture (see p. 99).

One of the major problems of producers of these crops is the fact that the market faces alternate periods of scarcity and glut. In periods of scarcity, foreign produce is imported and prices are very high for both the local and imported products. During periods of glut, farmers suffer from low prices received for their goods. The reduction of imports, the development of out-of-season varieties, the setting up of processing plants, the introduction of a wider

variety of crops and the institution of proper marketing facilities are the declared aims of the Government.³⁵ Marketing facilities and praedial larceny are particularly worrying to farmers and undoubtedly appear to affect production adversely.

Sugar cane and other crops (figure 31)

This class includes the crops enumerated above and sugar cane. All the sugar cane in these areas is grown by peasant farmers. The other crops grown are mainly for subsistence, but any surplus is sold. In areas shown under this class in the north, especially those adjacent to the urbanised strip, production of other crops is mainly for commercial purposes (see above). It would appear that, as the demand for market garden products grows, more and more land which is under sugar cane may be put under other crops. The present-day market garden area of Aranjuez was under sugar cane in the 1930s. Today no sugar cane is grown there. Further east, the production of market garden crops is expanding. However, because these crops are intensively grown, and will take up relatively little land to satisfy the local requirements, which are its only outlet, one cannot expect a massive expansion of these crops.³⁶ Easy disposal, reasonable prices for the farmers and an even supply of market garden products throughout the year, are some of the problems awaiting solution.

Sugar cane (figures 17 & 31).

This is the major land use. This crop is grown over a wide variety of soils under the two systems of production.

Land occupied by farmers

These lands are mainly areas shown on the map (figure 17) as sugar cane on small fields, rice and sugar cane and sugar cane and

35. Draft third five-year plan, pp.239-289.

36. Discussing the problem of diversification and the growing of market garden produce, the 1966 Jamaican Sugar Commission says that "the market, moreover, is often limited and quite a small increase in the acreage could drive prices down to an unremunerative level." P.72. Possibly a similar situation exists in Trinidad.

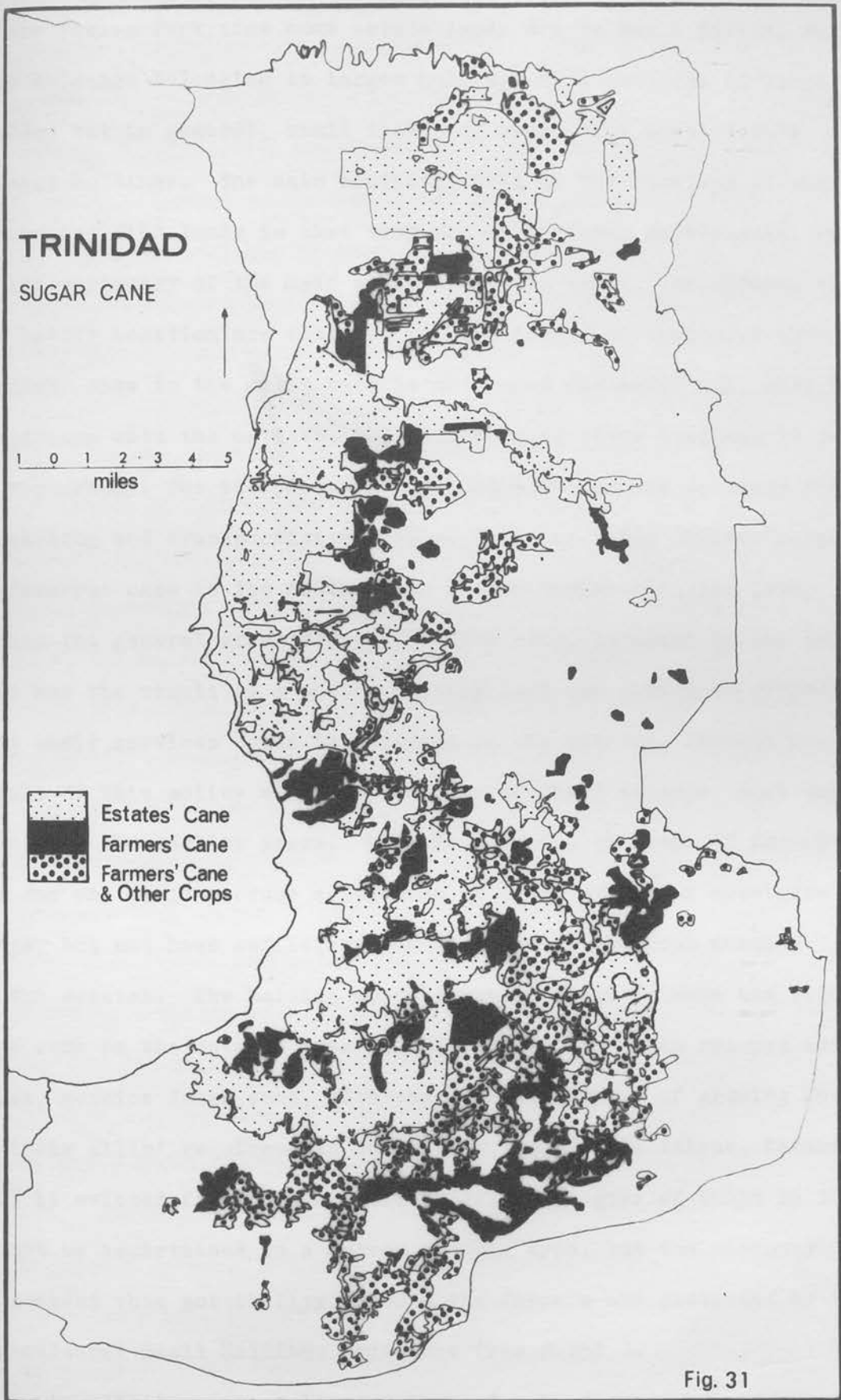


Fig. 31

other crops. Not all the small fields are under farmers' cane, for in the Forres Park area some estate lands are in small fields, while some holdings belonging to larger holdings show patterns of large fields, but in general, small fields of sugar cane characterise peasant holdings. The main characteristic of the location of these farmer-occupied lands is that they are either near settlements, or on the periphery of the main sugar producing areas. The effects of the latter location are that, it is more costly to transport the farmers' cane to the mills because of longer distances and, that by comparison with the estates, the land is more often marginal in terms of topography. The steepness of the land adds further problems for harvesting and transportation. Again, there is a far greater acreage of farmers' cane in the south. Much of the farmer-occupied lands within the general area producing estate cane, is owned by the estates. This was the result of a policy whereby land was rented to workers so that their services could be retained on the estates. Another possible result of this policy was the profusion of small farmers, more extensively in the earlier years. For the estates, the type of farmer required, was one who could produce a few tons of cane, grow some subsistence crops, but not have sufficient land to prevent him from working on the estates. The holding must be small enough to make him require wage work on the estates (see p.139). There have been rumours and, at times, genuine fears that, with the estates capable of growing more of their mills' requirements themselves, using less labour, farmers will be evicted from estate-owned lands. The degree of truth in this cannot be ascertained in a survey of this type, but the circumstances do present this possibility, though the farmers are protected by the Agricultural Small Holdings Ordinance (see p.153).

As will be seen, a large number of cane farmers are workers on

the sugar estates (table 15) and, hence, have an opportunity of working with modern techniques of cane production. They may not have the resources to provide the same type of equipment that would permit the imitation of all estate practices, but all farmers interviewed, whether they worked on the estates or not, accepted that they benefitted considerably by observing estate practices. It seems true to say that farmers benefitted more from this than from work carried out by the extension services (see p.217).

In terms of land utilisation, it is obvious that the estates are more efficient, although this does not refute the claim that there are individual farmers who are just as efficient as the estates. However, far too often in the sugar cane lands growing the farmers' crops, there is a cover of rather poor cane. This does not happen everywhere, for some of the best farmers are in the area called the Valley Line, which is in the Oropouche Valley. Here, and in most of the southern areas, the impression received, during field investigations, was that of greater efficiency and better management than in the north; this view was supported by the opinion of field officers of T.I.C.F.A. There may be a number of reasons for poor management by farmers, but among them the following must be important: many farmers do not depend entirely on cane; they may not be aware of the best practices; they may not afford good management (financially); income from the crop has been low for a number of years and hence, it is not worth spending much energy on this crop; and lastly, the nature of the crop permits maltreatment (or no treatment) and still produces a return. One of the above reasons, that of low income, has a corollary that farmers are conscious of the returns they obtain for their own or their family's labour. This characteristic is not usually mentioned as far as farmers are concerned. In fact, it is more often said, in Trinidad and elsewhere, that farmers are unaware

of, or do not take into account, the large inputs of family labour involved in the production of a crop. This has also been seen in rice production where farmers found that returns were too low. There are exceptions to this general occurrence. Admittedly, these practices lead to inefficient utilisation of land, but show that farmers, in spite of not keeping accounts, are able to realise when they are not obtaining a reasonable return. As is to be expected, effort is greatest when prices are high.

Land occupied by estates:

The large fields which characterise the estate lands stretch relatively unbroken from the far north to the Oropouche Lagoon, with a bulge in the Ste. Madeleine area (figures 17 and 31). There are two major incursions into the east and these are in the south and in the Caparo valley. The system of production has been described already, and undoubtedly covers the largest area of efficient land utilisation in the country. Estate canes are grown on a variety of soil types ranging from poor to good. The same is true for all the estates. By way of example, the land utilisation of the holdings of the largest estate will be described. It has already been pointed out that the estates' cultivation cover the flat lands in the north, and the undulating lands of the south, generally within easy reach of the mills.

The estate (Messrs. Caroni Ltd.) owns 74,000 acres, of which 7,800 acres are rented to farmers who grow mainly cane on these lands (table 8). Some 1,500 acres suitable for cane is being prepared for planting. Of the total holdings over 71% or 52,000 acres, are cultivated in cane by the estate. If the lands tenanted by farmers, those growing estate cane and those in preparation for

Table 8. Distribution of land held by Caroni Ltd.

<u>Agricultural land</u>	<u>Acres</u>		<u>Percentages</u>
Estates' cane	52,161		
Farmers' cane	7,800		
Suitable for cane cultivation	1,454	61,415	83.4
Other crops:			
Rented for market gardens, rice etc.	266		
Tree crops	259		
Pasture	948	1,473	2.0
<u>Service Areas</u>			
Factories, distillery, workshops, roads and railway	4,995		
Staff Housing, Clinic	594		
House lots rented to employees	836		
Recreation grounds	315	7,740	9.2
Miscellaneous, including swamp land	3,987	3,987	5.4
		<u>73,615</u>	<u>100.0</u>
		acres	

Source: Caroni Ltd. Sugar and the Land, 1967. Appendix II.

planting are included, over 61,000 acres, or 83%, are or soon will be producing cane. When one considers that most of the remainder is taken up by buildings or non-agricultural lands such as swamps, and that much of the pasture is for grazing mules and water buffaloes used as draught animals in the sugar cane fields, it is apparent that the crop is grown in a system of monoculture.

There is no doubt that the estate lands are efficiently utilised. A 1957 F.A.O., report on Trinidad recorded that "it must be remembered that the sugar estate area, although intensively cultivated is naturally poorly endowed for agriculture; the soil is generally of low fertility and difficult to drain; in an uncultivated state it

would appear far less suitable for agriculture than some presently uncultivated areas.³⁷ The resources of large firms, therefore, have been used to upgrade the efficiency of land utilisation. This is further borne out by the increase in yields over the present post-war period (figure 6).

The divorce between crops and livestock, except for draught purposes, in peasant agriculture will be noted. The use made of the pasture lands on the holding of the largest estate is rather similar. The estate has a dairy herd of 100 head which supplies its personnel with milk. These animals are kept on pastures of planted grasses. However, most of the animals owned are water buffaloes and mules, used for draught purposes and grazed on unimproved pastures. These animals have been used until recently over all areas, but are now confined to areas of more difficult terrain for primary in-field transport. Animal-drawn carts are used for hauling cane from the fields to mobile crane sites where the cane is transferred either to mechanised road or rail transport. With the greater use of mechanical power, and mechanical harvesting and self-loading trailers, there is not the same demand for animal power. One result of this is that the water buffalo is being used as a new source of beef. This, together with a small acreage of tree crops, is the extent of diversification on this estate.

Built-up areas and settlements (figure 32)

All the areas shown under this class (except for small kitchen gardens on house plots) are permanently lost to agriculture. Housing, industry and communications occupy almost all the areas shown. The mapped area takes in just over half the total population of

37. F.A.O. Report to the Government of Trinidad on the reclamation of the Caroni, Oropouche and Nariva areas, No. 636, 1957.

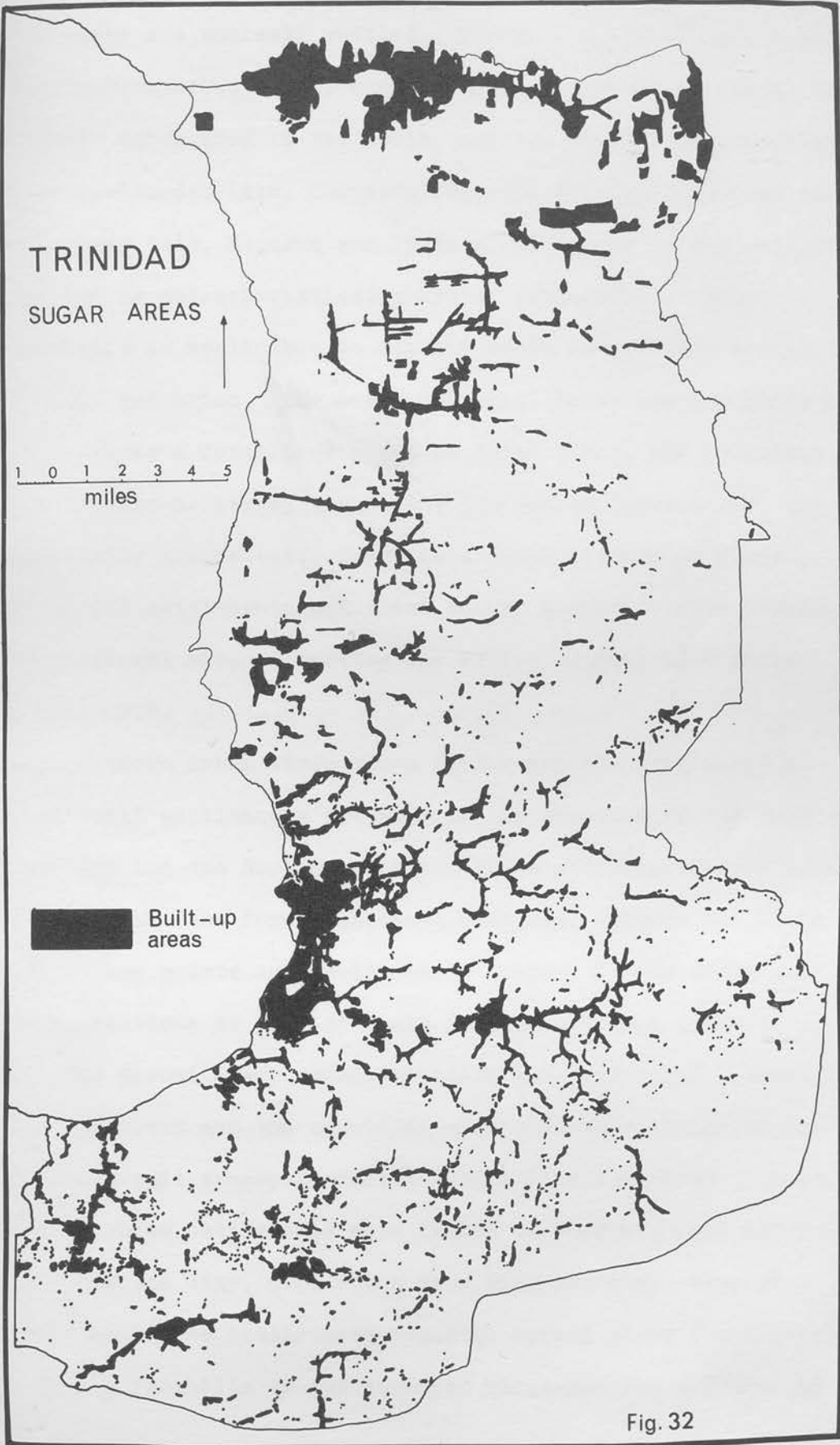


Fig. 32

the island. Generally, the eastern areas corresponding to the forested areas are sparsely settled. The main areas of settlement are the northern urban strip, shown between San Juan and Arima, the San Fernando urban area in the south, and the smaller centres such as Chaguanas-Longdenville, Couva-California, Princes Town, and outside the sugar belt, Siparia and Fyzabad. The rest of the settlement is rural and is characteristically linear (figure 32). This characteristic is applicable to all the urban settlements except San Fernando and Arima. The main industrial locations are those in the urban areas; a fertiliser plant at Point Lisas; the petroleum installations at Pointe-a-Pierre; the cement factory at Claxton Bay; and the sugar mills themselves. There is a dense network of roads connecting all settlements and these occupy a considerable acreage. The international airport serving the entire country also falls within this area.

The northern urban strip shown on the map was originally a string of small settlements situated at the junction of the northern range valleys and the Northern Plain. These settlements such as San Juan, St. Joseph (the former capital), Tunapuna, Arouca and Arima, were collecting points and small market towns. It was along this line that communications to Port-of-Spain in the west were easiest. To the north of the Caroni Swamp, transportation was sandwiched between the swamp to the south and the mountains of the Northern Range to the north. Both road and rail transport followed this line therefore. Later, because all these settlements were linked by road and rail and hence within easy reach of the city, population grew very rapidly. What were originally nucleated settlements began to spread along the routeways occupying the foothills of the northern range and the terraces of the

Caroni river. The result of this continued east-west expansion of these settlements is a massive urbanised area stretching almost unbroken for twenty miles between Diego Martin in the west and Arima in the east. Now there are incursions in the Northern Range valleys, notably the Diego Martin, Santa Cruz and Maracas-St. Joseph valleys, the three that are nearest to Port-of-Spain. These perform mainly dormitory functions for Port-of-Spain, though, with the spread of industry further east, this is becoming less so.

In this entire strip there are relatively few people who are cane farmers. Those who are cane farmers still, live in the Arouca area and in the south-east suburbs of Arima, towards Guanapo. The important type of farming here is market-gardening, which for a time was concentrated in the irrigated lands of Aranjuez, but has now spread all along the southern edge of the urbanised area. Some valuable agricultural land has been lost in the process of urban expansion.

San Fernando is the second largest town in the island with a population of about 40,000, but over twice this figure if its suburbs are included. This town provides services for its own population and for the oil and sugar industries. The largest oil refinery and petrochemical plant in the country are at Pointe-a-Pierre, on the northern boundary of San Fernando. One of the two largest sugar mills is located at Ste. Madeleine a few miles to the east. The headquarters of both the union representing the oil-field workers and the association representing the cane farmers are located in San Fernando. This makes the town a focus for both the major industries of the country. The urban population and the high wages of the oil industry have provided an outlet for market-garden produce for growers in the surrounding areas.

There are five small towns within the area of the map, each

parts, settlements is usually along the river valleys, but above the
 N. see Haxballie, G.E. *Some aspects of the settlement geography of a
 Trinidadian community*, M.A. dissertation, Univ. of Alberta., 1966
 This work is a study of Chaguanas.

with populations of between 10,000 and 15,000. They provide services for far larger populations. Two of these, Siparia and Fyzabad, fall just outside the sugar belt and are within the zone of producing oil fields. The other three are Chaguanas with the Woodford Lodge Mill, Couva with the Brechin Castle mill and the main offices of the largest estate, and Princes Town near the Usine Ste. Madeleine. These three latter can be described as sugar towns because they owe either their existence and/or growth to the siting of sugar mills. They are all almost single street towns, along which activities take place. They provide some social services and are also administrative centres with wardens' offices and magistrates' courts. They also have cinemas and banks. Their main functions, however, are as market centres for the surrounding areas. Traditionally, Couva was the more important of the two northern towns, but recently Chaguanas has emerged as being of greater importance.³⁸ Chaguanas possibly serves a larger area than either of the other two towns. It caters for settlements in the Caparo valley as far south as Tabaquite. Further south of Tabaquite, services are provided by Rio Claro. The villages of Las Lomas, Warrenville, Bejucal, Felicity, Orange Field and Chase Village, and those settlements between these and Chaguanas are served by Chaguanas. Couva and Princes Town both benefit from proximity to larger sugar mills and the former from the location of the fertiliser plant just to its south. It appears, however, that they are too near to San Fernando which provides a greater variety of facilities and hence restricts the use of these two towns as service centres. Both are within twenty minutes by car from San Fernando.

The rest of the population within this area is scattered in linear settlements along roads and traces. There is a greater density over the sugar cane areas than over the forested areas. In the northern parts, settlements is usually along the river valleys, but above the

38. See Rajballie, G.B. Some aspects of the settlement geography of a Trinidad community, M.A. dissertation, Univ. of Alberta., 1966
This work is a study of Chaguanas.

normal flood level. In the southern undulating lands, the roads and settlements follow the crests of the ridges. In the Oropouche Swamp, there are some very small settlements occupying islands of higher ground. Almost all the rural settlement is linear. The disadvantages of this type of settlement, such as the lack of a concentrated population resulting in greater expenses in the provision of amenities, the lack of cohesion and the attendant transportation problems, are not discussed here: only those aspects affecting agricultural production are considered.

For an agricultural population, linear settlement of this type provides obstacles to improvements in agriculture. This is so especially because farmers have not single plots of land, but fragmented holdings. This means that farmers find it very difficult to rear livestock, for the animals must be taken to and from the fields, often causing damage to crops belonging to other farmers, and the animals have to be stall-fed at night. Generally, the animals are tethered on fallow or waste land during the day and put in stalls during the night. The difficulty involved in rearing animals under these conditions effectively prevents the expansion of livestock rearing. Praedial larceny is also a major problem. As farmers live away from their plots of land, they cannot protect food crops from this menace. This causes farmers to restrict their planting of such crops to subsistence levels. During the survey, the opinion was expressed on several occasions by farmers that "it is all right if they steal, so long as they leave some for me." This is an attitude of resignation and is directly related to settlement pattern and farm structure. Settlement and fragmentation also preclude the efficient use of time and machinery.

There has been only minimal official restriction to linear settlement. A few rather small and unsuccessful agricultural settlements

were planned, such as Bamboo Grove No.1 and Bamboo Grove No.2, the Agostini and Monroe Road settlements. A new land settlement is also being developed in Carlsen Field; this settlement seems better designed, with farmers living on bigger holdings (20 acres) than were provided in the earlier settlements. This settlement is still in its infancy and no opinion can be expressed as to its possible success. It may be mentioned that one of the main intentions of the new project is to diversify agriculture among farmers in the sugar belt. Generally though, the linear settlement pattern causes hardships. As provision of facilities is expensive, all facilities cannot be provided in these villages. This type of settlement burdens the farmers with all its disadvantages and few of the advantages of village life. This inefficient and wasteful pattern of settlement seems to have evolved from the land disposal policy of the estates. The tendency is for these settlements to expand along existing lines and the result is greater sprawl.

Besides the industries directly related to the sugar industry, such as the mills, distilleries and a refinery, other industrial land users within this area cover a reasonably wide range of manufactures. By far the two most important industrial plants are the oil and petrochemical installations at Point-a-Pierre and the fertiliser plant at Point Lisas. Most of the other industrial concerns are small and are located within the urban areas of the north, in San Fernando and its environs, and on industrial estates such as at Plaisance, Streatham Lodge and at Omeara, south of Arima. Some industries are located in the small towns and villages of the cane belt itself. The largest are cement, brick, concrete products and paint manufactures. Furniture, clothing, jewellery, pottery handicrafts, printing and miniature food processing firms are at Chaguanas, Chase Village, Couva and Princes Town. However, the population

agricultural pursuits at the present time. Also fields occupy valley lands at the

is still mainly rural and agricultural. Further employment outside agriculture for people living within this area, is provided in establishments in Port-of-Spain and San Fernando or the industrial estates. There is a considerable, but so far unmeasured number of people commuting between settlements in the sugar belt and the urban centres.

Road, rail and air communications take up a substantial acreage. The greatest density of road and rail links in the country are within this area. Railways are now only used for sugar cane transport. Airfields are located at Piarco (the main airport), at Carlsen Field (a disused U.S. airfield) and at Camden near Couva which is used as the base for aerial control of fires and pests by the largest sugar estate. It is worth noting that Piarco and Carlsen Field are on the Piarco and Long Stretch Fine Sands which are unfavourable for agriculture. Camden airstrip occupies very little land on the better Couva loams.

Conclusion:

The sugar areas are the most densely settled rural part of the island. No sugar growing area can be described as really remote. The pattern of land use is seen to be one of monoculture of sugar cane by the estates and near monoculture by cane farmers. The cane growing area stretches unbrokenly across the west-central part of the island. Within this belt is a series of linear settlements, some of which have grown up into small towns providing services for the rural population. There are also scattered areas of intensive market-gardening and scrub and pasture, very little of the latter being improved. Outside the cane lands proper there is a forest cover which is broken by scattered shifting cultivation patches to the east and oil drilling sites to the south. There are two major swamps, the surfaces of which are effectively barred to agricultural pursuits at the present time. Rice fields occupy valley lands at the

swamp edges. At the fringes of the urban settlements, swamps and forests, are patches of land cleared for both agricultural and non-agricultural uses. This mosaic provides a synoptic view of a situation which developed because of historical reasons and is restricted to this part of the island by physical and climatic factors. Topography and rainfall appear to be the factors which are most important in restricting the sugar lands at their eastern borders. A comparison between Chenery's soil map of Central Trinidad³⁹ and the land-use map (figure 17) would show that sugar cane is planted on a wide variety of soils of differing plant nutrient status. Some cane is even found on the Piarco and Long Stretch Fine Sands, but these are the two soil types that show the greatest acreages of scrub. High land values near the urban centres is causing sugar cane lands to be taken over for urban expansion or for the expansion of market-gardening. Any expansion of the acreage under sugar cane must come from the eastern edges or from the swamp lands, the latter being more expensive to bring under production. However, expansion is envisaged mainly from increased yields. ⁴⁰

Within the area as a whole, except for the monoculture of the estates, there are different crop combinations which will be discussed later, but which can be introduced here. The Aranjuez area now produces only market garden crops, but was formerly a sugar producing area. Further east on some of the tenanted lands of Orange Grove, there is a combination of sugar cane with market garden crops. A similar combination exists at McBean. On the eastern edges of the Caroni Swamp there is basically a three-crop system of rice, root crops and sugar cane. A similar situation exists on the fringes of the Oropouche Swamp

39. Chenery, E.M., et al. Soil map of Central Trinidad, 1:50,000 op. cit.

40. Draft third five-year plan, p. 270.

where legumes are produced instead of root crops. In the Caparo Valley, Tabaquite, and the two areas not within the boundaries of the map, at Rio Claro and Brother's Road, tree crops and sugar cane supplement each other. Over the area as a whole there are farmers who depend mainly on sugar cane, but such farmers are concentrated in the central and southern areas. Market facilities, physical and climatic conditions are responsible for this distribution of crop combinations. It must also be noted that, except where rice and vegetables or root crops are produced at different times of the year on the same plot, generally crop rotation is not purposefully practised. Sugar cane is grown on separate plots from the other crops and for long periods on the same plot. Only with plant cane is intercropping of vegetables practised.

This then is a synoptic view of the sugar producing areas of Trinidad. Together with the historical development which has already been described, it provides the broad background against which the cane-farming community must be examined. The rest of this thesis is devoted to an analysis of the cane-farming population.

discussed in Appendix I. Here, the adequacy and validity of the results will be considered, followed by an analysis of some of the factors of production in Chapter V. The two subsequent chapters will deal mainly with production processes in the peasant sector and some of the institutional constraints which affect farming. The final chapter of this part of the work is an attempt to use the multivariate technique of factor analysis to view the peasant sector from a different angle, and to summarise the discussion. The data used in this and the succeeding chapters are derived almost entirely from the cane farmers' survey.

The survey

The method by which the sample of cane farmers was derived is considered in Appendix I. PART II

randomly selected farmers are widely distributed over the sugar districts and the sample is one which embraces farmers of various sizes, wealth and education. The survey relates to one year only, 1967, and it is

THE QUESTIONNAIREGeneral Observations

So far this work has been concerned with observations on the history and present-day organisation of the sugar cane industry in Trinidad. Against this background one can now turn to some detailed aspects of peasant cane production. Although there is some documentation of the peasant sector, such statistics as are available are insufficient in number and type for detailed analysis. Thus a sample study, covering 749 farmers, was carried out in order to ascertain with some degree of precision the fundamental characteristics of the cane-farming population.

The conduct of the survey and the problems it posed are discussed in Appendix I. Here, the adequacy and validity of the results will be considered, followed by an analysis of some of the factors of production in Chapter V. The two subsequent chapters will deal mainly with production processes in the peasant sector and some of the institutional constraints which affect farming. The final chapter of this part of the work is an attempt to use the multivariate technique of factor analysis to view the peasant sector from a different angle, and to summarise the discussion. The data used in this and the succeeding chapters are derived almost entirely from the cane farmers' survey.

and, as a proportion of total production, the lowest since 1957 (Figure 7). Average production per farmer was also down to 68.7 tons in 1967 compared to 72.6 tons in 1966 (Figure 9).

The survey

The method by which the sample of cane farmers was derived is considered in Appendix I. The randomly selected farmers are widely distributed over the sugar districts and the sample is one which embraces farmers of varying production size, wealth and education. The survey relates to one year only, 1967, and it is necessary to show how farmers' production in this year compares with production in other years. For farmers and the industry as a whole, 1967 can be regarded as a year when production was below average (figures 3 & 5). The farmers' proportion of production decreased to 31.3% from 32.9% in 1966 and 34.1% in 1965 (figure 2). Low prices prevailing after the boom year of 1963 were the main cause of this decline. The price paid for a ton of farmer's cane in 1966 was \$10.31TT (£2 2s. 11½d). This was the lowest since 1951. The price received in 1967 was \$11.21TT (£2 6s. 8½d). The average price paid for a ton of farmer's cane over the five-year period 1964-1968 was \$11.68TT (£2 8s. 8d). Most farmers consider that prices below \$12.00TT (£2 10s.) barely cover their costs (table 27). Next, one of the two largest mills, the Usine Ste. Madeleine, was not operating at capacity because of the teething troubles encountered when new machinery was installed. This not only meant that some farmers' cane had to be redirected to other mills, but also resulted in increased congestion and waiting at the purchasing scales (but see p.64).

If one looks at the total farmers' production for recent years, one sees that 1967 production was the lowest in absolute terms since 1959 (figure 3) and, as a proportion of total production, the lowest since 1957 (figure 2). Average production per farmer was also down to 68.7 tons in 1967 compared to 72.6 tons in 1966 (figure 9).

The five-year mean up to 1967 was 72.5 tons per farmer. However, there was no substantial difference between average production in each production class in 1967 as compared to the five-year period ending in 1967 (table 9).

Thus, one can see that 1967 was a 'sub-normal' year for farmers, but not entirely different from recent years. It would have been better to use production over a number of years as the basis of the sample, but this proved very difficult (see p.11 and Appendix I). The main effect of using the figures of production for a single year, 1967, is that in this case slightly lower statistics for yields per acre for individual farmer's production, and hence for income from sugar cane, may have resulted than would otherwise have been the case. However, the difference cannot be very great, for a comparison of averages from each class for five years with that for 1967, for both production and price received, shows that differences are not substantial (table 9).

A measure used to test the validity of the sample, the Carpenter L1 statistical test,¹ shows that the sample does not differ significantly in its most important aspect, size of production, from the population. A mean production of 68.66 tons per farmer is shown for 1967.² The mean derived from the sample is 72.21 tons. The Carpenter L1 test showed that the difference of 3.55 tons is not significant at the 99% level. Thus, using the major criterion through which the sample was chosen, that of size of production for

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1. This is an unpublished statistical test in which L1 tables are used for testing whether a sample average differs from some pre-assigned value. In this case the pre-assigned value is the population mean. The test was originated by Carpenter, R.G., in "Tables for instant statistical tests" (unpublished).
 2. Data provided by the Sugar Manufacturers Association of Trinidad.

Table 9.

Comparison of farmers' production of sugar cane for 1963-67 and 1967 by classes of farmers.

Classes of farmers	Five-year mean 1963-67	1967 mean
1 - 0 - 5 tons	3.43 tons	5.24 tons
2 - 6 - 20 "	13.40 "	13.40 "
3 - 21 - 50 "	33.73 "	33.98 "
4 - 51 - 100 "	73.54 "	71.35 "
5 - 101 - 500 "	185.82 "	183.18 "
6 - 501 - 1,000 "	663.54 "	634.19 "
7 - over 1,600 "	2,345.92 "	2,305.35 "
Av. for all farmers	72.57 "	68.66 "

Source: Compiled from data supplied by SMA.

1. In addition, a few farmers provided information of detailed costs of production.

individual farmers, it is seen that, with the difference being insignificant statistically, the sample should provide a reasonably good representation of the cane-farming population. The reliability of responses from farmers is discussed in Appendix I. However, it is worth noting that in all 831 farmers were approached, 789 of whom responded to questions; but that 10 of the completed questionnaires were discarded owing to serious inconsistencies (see Appendix I). Thus, 749 farmers are represented in the analyses, giving a response of about 90% of all farmers approached. This high response level was achieved because of generous co-operation from the Cane Farmers' Association and the sugar estates, and the fact that the survey was conducted through personal interviews. The distribution of the sample according to purchasing points is shown on figure 33.

Wherever estimates for the population are shown, they are derived from the sample statistics. Each stratum in the sample is raised by a factor equivalent to $\frac{100}{\text{sampling fraction}}$ for that particular stratum (table 2). An aggregate is then found for all strata and this is used as an estimate of the population.

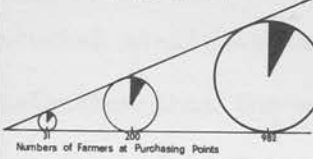
As can be seen from the questionnaire, a wide variety of questions was asked, but none, except the cost of cutting and transporting cane, relates directly to money incomes or expenditures³ (see p.13). Information of a detailed nature on a variety of subjects was not asked, partly in order to restrict the length of the questionnaire to reasonable proportions, and partly through fear of receiving inaccurate answers which could not be checked easily. Such questions include details of hours worked, seasonal variation of work,

3. In addition, a few farmers provided information of detailed costs of production.

TRINIDAD

Sample Survey
of Cane Farmers

Number of Farmers Interviewed



Numbers of Farmers at Purchasing Points

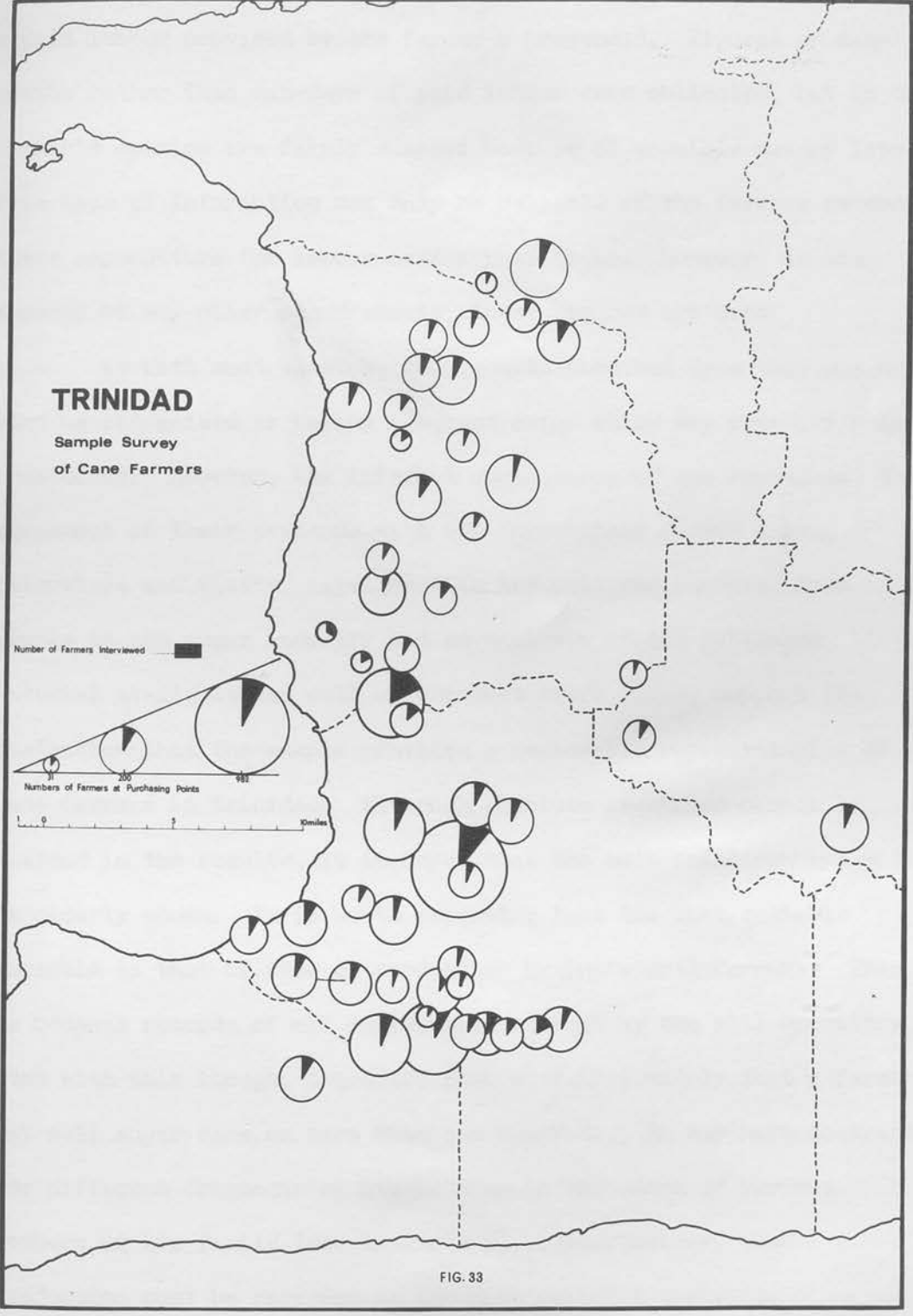


FIG. 33

consumption, income from off-farm occupations, incomes of other workers in the same households, and the actual number of hours of unpaid labour provided by the farmer's household. Figures of man-months rather than man-days of paid labour were collected, but in the author's opinion are fairly suspect because of possible memory lapses. This type of information can only be reliable if the farmers record their expenditure for labour over a year or so. However, in the absence of any other measurements, these figures are used.

As with most samples, the results obtained from this one must also be recognised as having inherent error which may possibly pass undetected. However, the internal consistency of the responses, the agreement of their evidence with the impressions formed during interviews and visits, together with the opinions received from people in the sugar industry and an analysis of the published material available, as well as the test cited above, support the contention that the sample provides a reasonable representation of cane farmers in Trinidad. Although absolute precision cannot be claimed in the results, it is hoped that the main relationships will be clearly shown. It is worth repeating that the most reliable variable is that of size of production by individual farmers. This is because records of all deliveries are kept by the mill operators. Even with this though, there are some pitfalls, mainly that a farmer may sell sugar cane on more than one contract. He may have contracts for different fragments of his holding in the names of various members of his family (see Appendix I). Nevertheless, cane production must be regarded as the most reliable variable.

1. See Claver, S.S. 'The economics of Trinidad cane farming', in 1963-64 Annual Report of TSCA, pp. 127-132; and Wilson, T.D. 'The economics of present cane farming in Trinidad', in *Trinidad News*, April 1956, pp. 135-140.

CHAPTER IV

THE FACTORS OF PRODUCTION

Attention is now turned to a variety of elements which can be regarded as the major factors of production. The land, in the sense of the farmers' holdings, capital, with the restrictions applying as outlined above, labour and management in the person of the farmers and their families are the factors considered. Some of the most frequently discussed problems of cane farmers have been those concerning the lamentably small average size of farms, their fragmentation and tenure.¹ Other significant aspects not so frequently considered are their location in relation to accessibility and topography, which are here considered first. These are especially important because they affect transport costs for a bulky product, and the greater costs deriving from difficult access eat heavily into the profits of cane production. Distance from purchasing point and factory is another important aspect of location of farms. These are the main characteristics of the farm with which this chapter is concerned. As far as the farmers themselves are concerned, the main characteristics considered are the extent of their dependence or lack of dependence on sugar cane, on other crops and on off-farm occupations, and their age structure, family and household size and the type of farm management possible with their

1. See Girwar, S.N. "The economics of Trinidad cane farming", in 1963-65 Annual Reports of TICFA, pp. 129-139; and Wilson, T.B. "The economics of peasant cane farming in Trinidad", in World Crops, April 1954, pp. 135-140.

general lack of proper agricultural training. As was indicated previously, no information was collected on actual money incomes, but by inference, an attempt will be made to determine the farmers' dependence on sugar cane. Some aspects of capital as a factor of production will be discussed in relation to equipment owned and expenditures for cultivation, labour and transport. Fertiliser as a capital input is considered in the next chapter where agricultural processes are discussed. The farmers' own and paid labour and the seasonal nature of employment are also considered.

The Land

The location and quality of farmers' lands

Although no detailed work has been done as regards the nature of the quality of farmer-occupied lands, generally it appears that farmers occupy relatively poor land. As noted previously, some estate-farmed lands are on poor soils, but with the farmers' lack of resources and knowledge to improve the productive capacity of their soils, the problem is more serious for the peasants.

From the point of view of accessibility, the land-use map shows that, generally, the farmer-occupied lands are peripheral in relation to the mills (figures 17 & 31) and much of it is marginal in terms of topography and access. It is easy to understand why cane farmers' holdings are located on these lands. Historically, the cane farmers were the last claimants for land and they had a comparatively low competitive ability for possession of the land. Hence, they were forced to occupy the generally inferior land. In addition, the estates, because of their greater resources and need to have their cane producing lands near the mills, came to occupy most of the better lands surrounding the mills. Further, with the farmers' lack

of resources, poor farming ability and insecure tenure, even lands that were of good quality would be quickly degraded. Thus the farmers' late arrival on the Trinidad sugar scene, their lack of resources and inferior farming ability are responsible for the peripheral location and poorer lands.

The peripheral location of the lands also bears considerably on access and transport costs and consequently on profits. Even when a farmer's plot of land is located near a purchasing point, the cane still has to be transported to the mill, the cost of this being borne collectively by all farmers through deductions made under the price formula. As early as 1933, Gilbert noted this problem and found it "difficult to see how a low grade product can stand such high transport expenses and still be profitable to the grower..... in particular when carts have to be hired."² The distances of the main plot of farmers' canes are shown by size groups on table 10. This table shows that almost four-fifths of the farmers have their main plots within three miles of a purchasing point. However, this illustrates the problems in a very restricted light, not only because farmers may have other fragments of their holdings located further away, but also because these purchasing points are scattered over the sugar belt in some cases over 20 miles from the mills (figure 15). The difference in costs of transport from farmers' holdings as compared to estates' holdings are correspondingly greater when individual and collective costs are taken together because of location. In addition, there is the quite sizeable problem for farmers who have to transport their canes from four to fifteen miles to get to a purchasing point. Farmers in the Rio Claro and Arena

2. Gilbert, op.cit., No. 84, p. 22.

Table 10: Distance of main sugar cane plot on a holding from purchasing point by classes of farmers (percentages).

Classes of farmers	0 - 1 mile	1.1 - 3miles	3.1-5miles	5.1-7miles	7.1-9 miles	9.1 miles and over
1	41.7	39.6	12.5	4.2	2.1	—
2	47.1	30.6	12.4	5.8	2.5	1.7
3	40.2	37.1	12.4	6.7	2.6	1.0
4	43.2	38.8	9.4	6.5	1.4	0.7
5	30.5	43.3	10.8	8.4	2.5	4.4
6	18.2	27.3	21.2	12.1	15.2	6.1
7	18.2	45.5	27.3	9.1	—	—
Population estimates	40%	37%	12%	7%	2%	2%

areas especially, suffer this problem of long distances when the scales are being run under a system of spells (see p199). For those farmers who hire transport, and are located far away from a purchasing scale, the cost of cutting and transporting one ton of cane is more than half the gross income per ton, and for those who own their transport the problem is that the greater distances take a longer time to cover. This can mean that a farmer will be able to sell only one, or possibly two loads of cane per day. In most cases there is a considerable waste of man-power. Thus the marginal nature of the land, both in terms of quality and accessibility, further make for uneconomic farm units.

The fact that there are over 70 scales, or purchasing points, some of them far away from the mills, has permitted, if not encouraged, the growing of cane in areas that otherwise would have been entirely uneconomic. In the past, when there were mills dotted over the cane belt, cane had to be transported only short distances to the mills. The centralisation of the industry's milling sector into six mills during the last two decades now means that cane has to be transported over longer distances to the fewer mills. This lengthening of distances from field to factory has affected farmers more than the estates, because the farmers are more peripherally located and hire a greater proportion of their transport. Centralisation of milling, therefore, has created a situation in which farmers in some cases have to pay over half of their gross returns on harvesting and transport from field to purchasing point (table 11).

The result of these two factors, the price formula and the provision of purchasing points, is that they provide more farmers the opportunity to grow a saleable crop and encourage the growing of cane

Table 11: ⁺ Cost of transporting one ton of sugar cane from field to purchasing point by classes of farmers (percentages).

Classes of farmers	No cost	Trinidad & Tobago dollars					
		4.50 & under	4.51 to 5.00	5.01 to 5.50	5.51 to 6.00	6.01 to 6.50	6.51 to 7.00
1	20.8	54.2	20.8	2.1	—	2.1	—
2	26.4	43.0	19.8	4.1	4.1	2.5	—
3	36.1	36.6	19.1	4.1	1.0	3.1	—
4	48.2	27.3	15.1	4.3	3.6	0.7	0.7
5	57.6	22.2	12.8	3.4	3.9	—	—
6	51.5	15.2	18.2	3.0	3.0	6.1	3.0
7	27.3	27.3	9.1	18.2	9.1	—	9.1
Population estimates	39%	35%	17%	4%	3%	2%	negl.

+Includes cost of cutting and loading. Some of the farmers who show no cost might have paid for cutting and/or loading, but not for actual transport.

in areas which, without the masking effect of the price formula, would be too peripheral to produce a bulky, low income crop. This in addition reduces the profitability of farms which are better located. The better located farms subsidise the transport costs of the farms more peripherally located. Rationalisation of the milling sector has added to their difficulty.

Size of holdings

Today the mean farm size is slightly greater than the 5.4 acres shown by Gilbert's 1932-33 survey.³ The average overall farm size, as estimated from the present survey, is 6.5 acres. That farm size should increase is easily seen for there are now about 10,000 farmers compared to over 17,000 in 1932; farmers' production is about 50% greater now than in 1932; and average yields per acre, of between 15 and 18 tons, were not substantially lower than yields of 17 to 19 tons found in the present survey (table 12). If the first four classes of farmers are taken together, then the average farm size is only 4.6 acres. The means of all four groups (table 13) fall below the overall mean and these classes form about 80% of all farmers. Generally, these have holdings of 10 acres or less (table 14).

Size of holding is possibly the major cause of dependence on off-farm income. Just over 60% of the farmers depend on off-farm incomes (table 15) and it is interesting to note that almost 60% of farmers occupy holdings that are 5 acres or less in size (table 14). This does not entirely equate the two proportions, for many of the farmers in categories 6 and 7, the larger farmers, also have off-farm incomes. A further 25% of farmers occupy holdings of between 5.1 and 10 acres. Thus only 15% of the cane-farming population have farms of more than 10 acres. If what is thought to be a reasonable figure in

3. Gilbert, No. 84, op.cit., table 37.

TABLE 12.

Farmers' Yields per acre by classes

Class of farmers	Yields per acre	Standard Deviation
1	5.23 tons	5.28
2	11.79 "	5.90
3	16.72 "	7.78
4	19.64 "	8.58
5	23.43 "	8.69
6	24.66 "	7.06
7	22.58 "	8.71
Population estimate	17 tohs per acre	

TABLE 13.

Average Farm size, and average sugar cane acreage by classes.

Class of Farmer	Av. farm size (Acres) ₍₁₎	Sugar Cane Acreage (2)	% (2) of (1)
1	3.48 acres	1.36 acres	39
2	4.07 "	1.87 "	46
3	4.45 "	2.75 "	62
4	5.97 "	4.35 "	73
5	12.42 "	9.50 "	76
6	45.03 "	28.45 "	63
7	117.80 "	84.91	72
Estimate of total farmer holding and sugar cane acreage	63,745 acres	42,086 acres	66

Table 14: Percentages of farmers by farm size and classes of farmers.

Classes of farmers	Farm size in acres										50.1- & over	
	less than 1.1	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-10.0	10.1-15.0	15.1-20.0	20.1-30.0	30.1-50.0		
1	33.3	14.6	16.7	8.3	8.3	12.5	4.2	2.1	—	—	—	—
2	14.9	28.9	23.1	9.1	5.8	10.7	4.1	1.7	1.7	—	—	—
3	3.1	21.1	21.6	16.5	9.3	22.1	4.1	2.1	—	—	—	—
4	—	5.8	11.5	15.0	20.9	36.0	10.1	0.7	—	—	—	—
5	—	—	1.5	2.0	6.9	42.8	22.1	12.8	8.4	2.5	1.0	1.0
6	—	—	—	—	—	—	3.0	18.2	24.2	39.4	15.2	15.2
7	—	—	—	—	—	—	—	—	—	27.3	72.7	72.7
Population estimates	6.7%	15.7%	15.9%	11.2%	10.2%	25.0%	8.5%	3.7%	2.1%	0.7%	0.2%	0.2%

These farmers who work for wage estates in any capacity including the carrying of estates' name on estates' or farmers' titles.

Table 15: Cane farmers - Types of off-farm occupations by classes of farmers (percentages).

Classes of farmers	(1) % working+ for estates	(2) % working for other farmers	(3) % working part-time on public projects	(4) % in full- time jobs	(5) % in self- employment	(6) % in full- time agri- culture	(7) % Unemploy- ed for 3mths or more
1	16.7	10.4	10.4	8.3	27.1	12.5	14.6
2	17.4	13.2	12.4	14.0	5.9	23.1	14.0
3	12.3	11.3	9.8	9.3	8.9	34.0	14.4
4	12.2	8.6	2.9	7.9	10.8	43.9	13.7
5	2.5	2.0	2.0	3.0	17.6	65.0	7.9
6	—	—	3.0	6.1	42.4	45.5	3.0
7	—	—	—	—	63.6	36.4	—
Population estimates	12.0%	9.4%	7.7%	9.0%	11.5%	37.5%	12.9%

+Those farmers who work for sugar estates in any capacity including the carting of estates' canes on estates' or farmers' carts.

terms of farm size is used, that of 20 acres, then a further 12% of cane farmers fall within this range. Thus one sees that about 97% of farmers occupy holdings of 20 acres or less. The 1963 Trinidad Agricultural Census showed that 93.3% of occupiers (for all forms of agriculture, but not including government departments) were on holdings of 24 acres or less⁴ (figure 34). The problem of farm size is, therefore, one which spreads beyond the sugar industry. Farm size is thus an important factor responsible for the vast proportion of farmers who supply small tonnages of cane. Admittedly, there are other factors, mainly the distribution of improved varietal types and cultivation practices which further account for low production. Yet, when farm size is again considered in terms of yields per acre, one sees that the smaller farmers also have the lowest yields per acre, so that size of farm and yield per acre seem to be directly related (table 12).

It has been pointed out that the development of cane farming was never planned except for contingency planning during the Great Depression and during and just after World War II, and that no determined attempt has ever been made to increase farm size. The farmers depended, as they still do, on the estates to process their cane. It was the double requirements of the estates, those of the demand for the farmers' labour and for the farmers' cane, that affected not only the growth of the peasant sector, but also farm size, because in the early stages of development of cane farming, farmers were generally tenants of estates. During periods of depression farmers were encouraged to grow more cane, but during periods of prosperity their labour was required on the estates.⁵ Because of this, the

4. Agricultural Census 1963, Publication No. 3, table 1.1, p. 1.

5. Girwar, *op.cit.*, p. 135.

TRINIDAD

NUMBER OF HOLDINGS BY COUNTY
AND BY HOLDING SIZE 1963

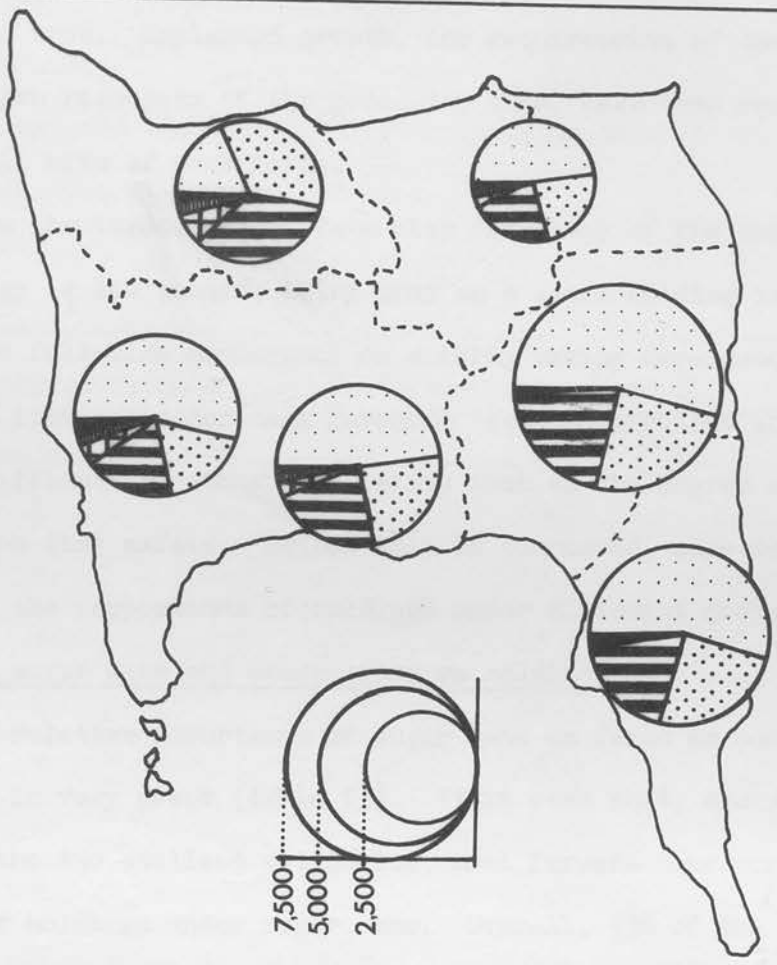
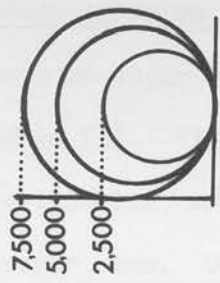
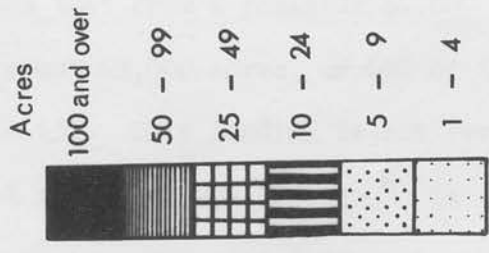


Fig. 34

estates encouraged the small part-time farmer, and was against the larger farmers who could compete with the estates for labour. The result was the preponderance of small farmers in the Trinidad sugar industry. This has become decreasingly so (figure 10), but nevertheless remains true. Unplanned growth, the requirements of the estates and the meagre resources of the peasants, then, have been responsible for the small size of cane farms.

From the inadequacy of farm size flow many of the problems of cane farming; a low income, bulky crop on a small holding is not conducive to full-time employment on a farm, making dependence on off-farm income inevitable for many farmers. Yet the problems are made even more difficult by other constraints such as the degree of fragmentation that exists. Before this is discussed, some consideration is given to the proportions of holdings under different crops.

Acres of sugar cane and other crops on holdings

The relative importance of sugar cane on farms as compared to other crops is very great (table 13). It is seen that, except for the farmers in the two smallest categories, most farmers have more than 60% of their holdings under sugar cane. Overall, 93% of the farmers claimed that sugar cane was their most important crop (table 16). A global estimate shows that from a possible 64,000 acres comprising farmers' holdings, about 42,000 acres, or 66% of the land, is devoted to sugar cane (table 13). This finding is not very dissimilar to the 62% found by Gilbert in his survey in 1932.⁶ It is also shown how the proportion of land in sugar cane differs in the various classes and how the dependence on sugar cane appears to increase with size of production. Thus sugar cane is the major agricultural enterprise for

6. Gilbert, No. 84, op.cit., p. 31.

Table 16.

Farmers who claim sugar cane to be their main enterprise by classes of farmers (percentages).

Classes of farmers	% with sugar cane as main enterprise
1	79.2
2	85.1
3	95.4
4	99.3
5	98.0
6	97.0
7	100.0
Population estimate	93%

over nine-tenths of the farmers growing the crop and it becomes increasingly so with the larger farmers, except those selling over 500 tons of cane. A drop is shown here in the proportion of land under sugar cane because these large producers have been able to buy small acreages of tree crops, or must utilise some of their land for pasturing animals used for in-field transport. The table shows that more farmers in the two lowest production categories claim that sugar cane is not their main crop (table 16). Only 3% of the farmers selling more than 20 tons of cane indicated that other crops provided more important enterprises. For the two lowest categories the proportion is about 16%, that is, 16% of the farmers claimed that sugar cane was not their main commercial agricultural enterprise. These were usually farmers who grew either tree crops or vegetables.

Other relevant points are, that an estimated 42% of all farmers have either no acreage or less than half an acre under 'other crops', which include all crops except sugar cane and tree crops (table 17). In all, some 97% of farmers have from 0 to 5.4 acres under 'other crops', but about 88% are within the range of 0 to 2.4 acres. Very few farmers have more than 5 acres under 'other crops' and all have less than 25 acres. 'Other crops', or non-tree crops, are fairly widespread on cane farmers' holdings, but occupy only small acreages and are mainly for subsistence purposes. Only near the urban areas and in the Bejucal-Charlottesville, Debe-Penal, McBean and Orange Grove areas are non-tree crops of commercial significance (figure 35). Only one-third of farmers grow other crops, including tree crops, commercially. It is apparent, therefore, that for the majority of farmers sugar cane is the main crop, but that for most it is not a big enough enterprise to provide full employment and

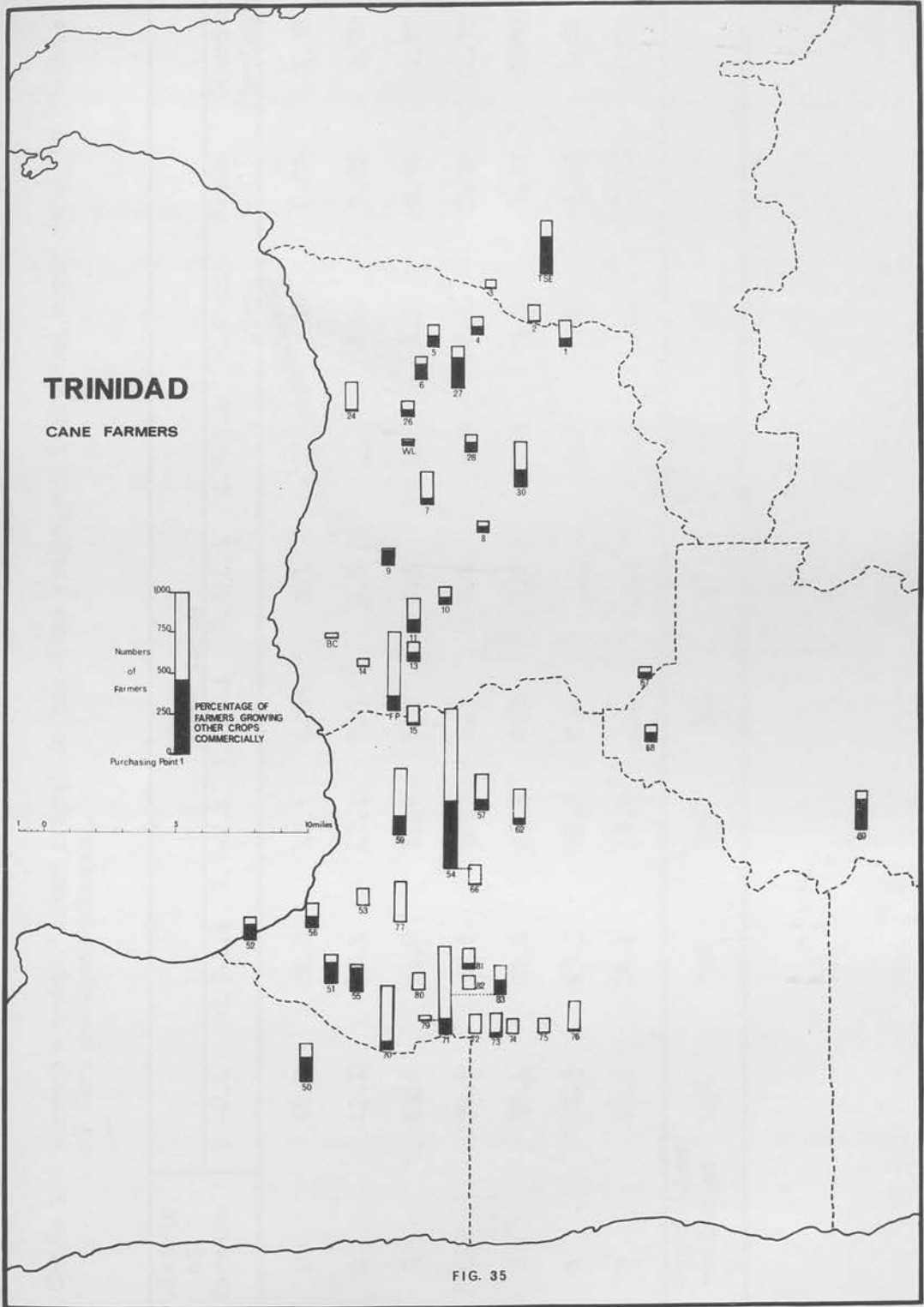


Table 17: Acreages under 'other crops' or non-tree crops, not including sugar cane, by classes of farmers (percentages).

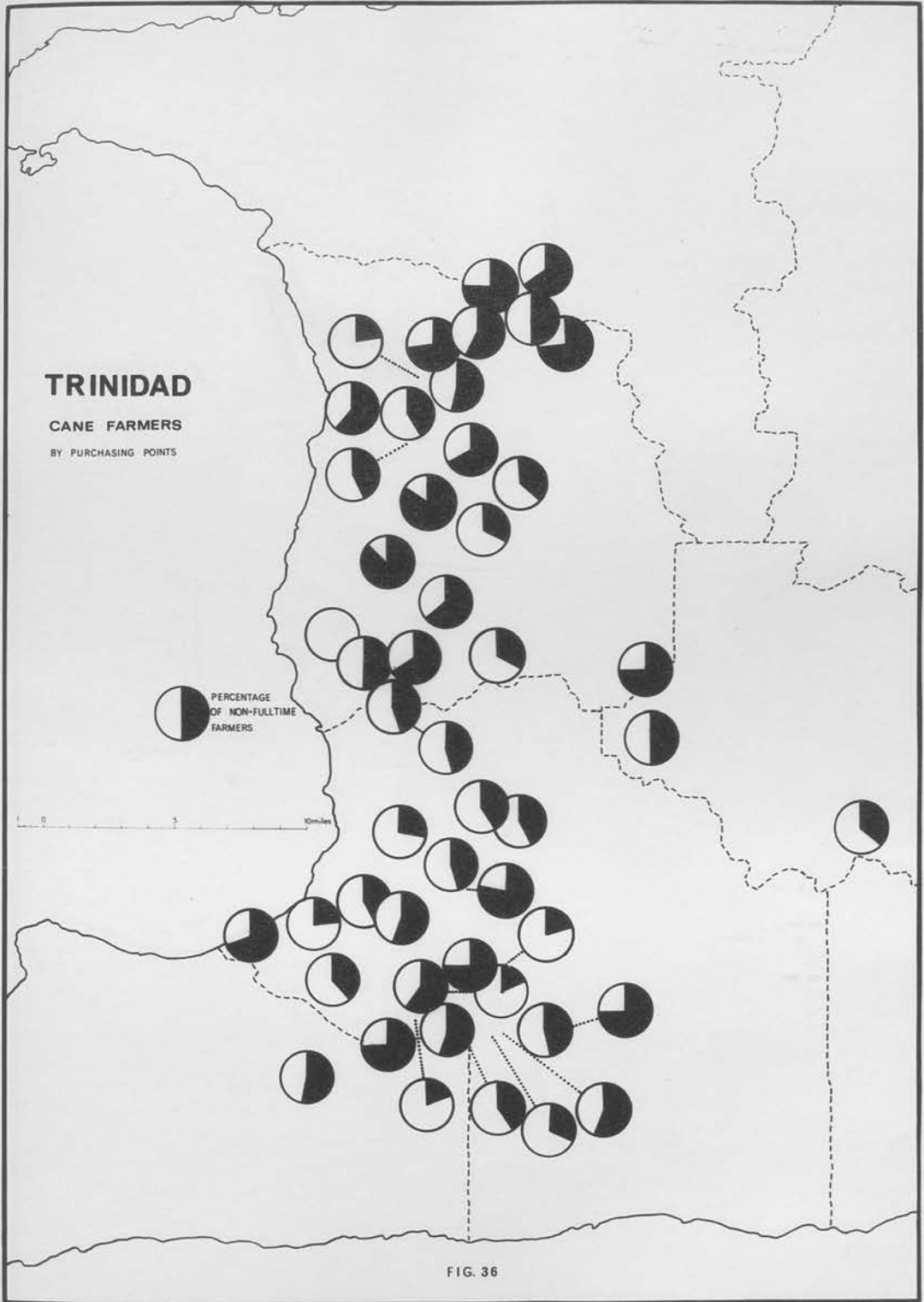
Classes of farmers	Acres							Means	Standard deviations
	0-0.4	0.5-1.4	1.5-2.4	2.5-3.4	3.5-4.4	4.5-5.4	5.5 and over		
1	56.3	22.9	12.5	4.2	2.1	—	2.1	0.75	1.38
2	42.1	33.1	17.4	3.3	2.5	—	1.6	1.02	2.02
3	43.8	34.0	11.9	6.7	0.5	1.5	1.5	0.89	1.57
4	39.6	32.4	18.7	4.3	3.6	0.7	0.7	0.99	1.32
5	39.4	27.6	13.8	8.9	3.0	1.5	5.9	1.32	1.92
6	30.3	27.3	21.2	9.1	—	6.1	6.0	2.20	4.34
7	63.6	18.2	18.2	—	—	—	—	0.54	0.82
Population estimates	42%	32%	15%	6%	2%	1%	2%		

reasonable incomes, resulting in many part-time farmers (figure 36 and tables 15 & 26). The distribution of part-time farmers shows that such farmers are found almost everywhere in the sugar growing areas, but that there are concentrations near the urban areas in the north, in the central areas near the mills and near San Fernando, where some find part-time occupations in the town or on the sugar estate. The occurrence of part-time farming is so widespread that location as a factor seems to be weaker than size of holding. Where both factors are evident, then, there is a greater concentration of part-time or non-full-time farmers.

It must be noted also that tree crops are relatively unimportant among cane farmers (figure 37 and table 19). About 90% of farmers have no tree crops on their holdings. Only in those few parts of the sugar areas, where tree crops and 'other crops' assume commercial significance, are cane farmers also dependent on other agricultural enterprises. Very few have such crops as their main enterprises (figure 38). It has already been noted that in those areas where farmers grow crops other than sugar cane for commercial purposes, the average production per farmer is generally lower (figure 12). This is related to farm size because, with farms being small, if more land is devoted to one crop it will be only if the acreage under another crop is reduced or taken over entirely.

Fragmentation

Fragmentation of holdings is very widespread. In many cases between five and eight fragments make up a farm of less than 15 acres (table 20). As is to be expected, the majority of farmers in the first



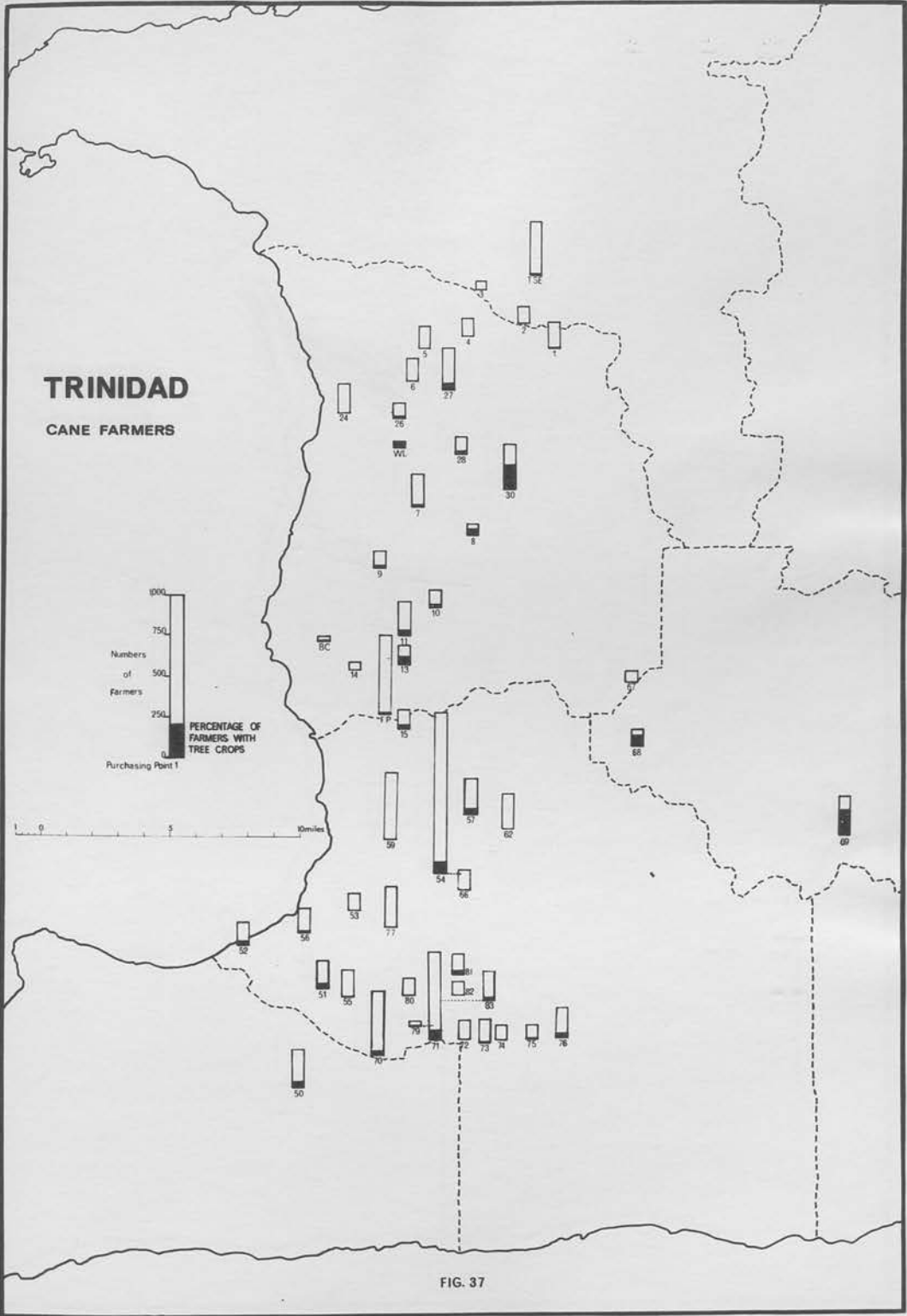


FIG. 37

TRINIDAD

CANE FARMERS

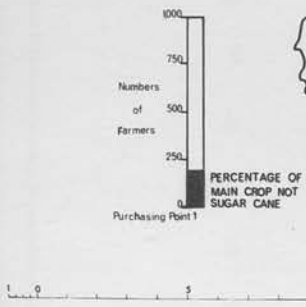


FIG. 38

Table 19.

Acreages under tree crops by classes of farmers (percentages).

Table 18.

Farmers who grow other crops commercially by classes of farmers (percentages).

Classes of farmers	Homs	Acres		
		1 - 5	6 - 10	11 and over
		% who grow other crops commercially		
3	1	90.2	37.5	0.5
4	2	86.3	37.2	5.0
5	3	88.7	34.0	3.0
6	4	75.8	30.2	12.1
7	5	63.6	30.0	18.2
	6		30.3	
Population estimate	7	50%	18.2	25
Population estimate		33.5%		

Table 19.

Acreages under tree crops by classes of farmers (percentages).

Classes of farmers	None	Acres		
		1 - 5	6 - 10	11 and over
1	91.7	2.1	2.1	4.2
2	93.4	3.3	0.8	2.5
3	90.2	8.2	1.0	0.5
4	86.3	10.8	2.9	5.0
5	88.7	7.4	1.0	3.0
6	75.8	9.1	3.0	12.1
7	63.6	9.1	9.1	18.2
Population estimates	90%	7%	1%	2%

Table 20: Numbers of fragments on holdings by classes of farmers (percentages).

Classes of farmers	Numbers of fragments								
	1	2	3	4	5	6	7	8	9 and over
1	62.5	29.2	4.2	4.2	—	—	—	—	—
2	43.0	37.2	14.9	3.3	1.7	—	—	—	—
3	32.5	36.6	19.6	8.2	1.0	0.5	1.0	0.5	—
4	20.1	33.1	28.8	10.8	4.3	0.7	1.4	—	0.7
5	9.9	22.7	22.7	17.2	8.9	12.3	5.4	0.5	0.5
6	6.1	3.0	12.1	18.2	21.2	6.1	18.2	6.1	9.1
7	9.1	9.1	18.2	18.2	9.1	18.2	—	—	18.2

category, 62.5% have compact holdings. The other categories show a decreasing proportion with compact holdings and, not only an increasing number of farmers with fragmented holdings, but also an increasing number of fragments. Moreover, not all farmers who farm compact holdings live on the farms. Many live on small house plots in the villages. The same is also true of farmers who have several fragments, that not only do they farm fragmented holdings, but that they may also live in the villages entirely away from any of the fragments. This is reflected in the settlement pattern already discussed and depicted on the land-use map. The mean farm size and average number of fragments of land which constitute holdings are shown on table 21 and provide another measure of the extent of fragmentation.

The consequences of fragmentation, which are experienced in other parts of the world, also apply here. Farming techniques that can be carried out on a single parcel of 15 acres cannot be undertaken on a highly fragmented holding of similar acreage. There is inefficient use of time and greater problems in transporting tools and fertiliser to the several fragments. Moreover, the greatest advantage that is claimed for peasant farming, that of close supervision, is lost on a fragmented holding. As has already been mentioned (p.109), praedial larceny is a serious problem. Although the State is instituting legislation to remove this problem, the fact that so many farmers live away from their holdings, militates against the eradication of this practice. Because food crops for local consumption, rather than sugar cane, are subjected to larceny, it may also be true to say that fragmented holdings effectively prevent the greater production of food crops. There is, however, one unusual, but

TABLE 21.

Mean farm size, number of fragments, and size of fragments by classes of farmers.

Classes of farmers	Mean farm size (Acres)	Number of fragments	Mean size of fragments (Acres)
1	3.48	1.46	2.38
2	4.07	1.86	2.19
3	4.45	2.17	2.05
4	5.97	2.60	2.30
5	12.42	3.56	3.49
6	45.03	5.22	8.64
7	117.80	4.73	24.90
Population estimate	6.5		

important advantage which fragmentation brings. This derives from the nature of sugar cane as a crop which has a considerable amount of dry foliage that can be easily set on fire. During the survey, several farmers, when asked if they preferred to have their entire holding in one parcel, rejected this idea vehemently. They said that they were prepared to waste time moving from one fragment to another, to accept a misuse of equipment, to stand higher transport costs and even to permit some of their food crops to be stolen, but that they could not stand the risk of all their cane being burnt at the same time, which is a distinct possibility with a compact holding. They are aware that they do not have the resources that are at the disposal of the estates to remove burnt cane before deterioration takes place. This is a genuine fear which can only be allayed if adequate safeguards are provided. Admittedly, the fact that with a compact holding a farmer will be living on the farm and so could contain a fire at an early stage does minimise the risk, but does not alleviate it entirely. One instance in which fragmentation may be unavoidable and thus acceptable, is when rice or some other crop which may have different requirements, is grown by a farmer on land that meets the demands of the crop.

Fragmentation is thus a serious problem and there is possibly as great a need to consolidate holdings, as there is to increase farm size. This will not only make for more efficient farming, but will also encourage diversification into food crop production and livestock rearing, for the now prevalent praedial larceny can be arrested because of the closer supervision. However, the potential danger that consolidation of holdings will bring, that of cane fires and the consequent necessity to dispose of burnt cane before sucrose inversion takes place, could possibly result in ruin to farmers and must be

provided for. It is worth noting that fires are most likely to occur in the dry season when cane is ready for harvesting.

Tenure.

The survey showed that only 15% of farmers own all their land (table 22). As is to be expected, the highest proportion of such farmers is in the largest production category, but even among these farmers only 45.5% claimed complete ownership of their holdings. The same proportion rented land from private landlords. In all the other categories, varying proportions from one-fifth to one-eighth of the farmers own their entire holdings. With almost 85% of farmers being tenants of various types, it is obvious that security of tenure is another problem which has inhibited the development of the small farm, at least until recently.

Up to 1961, the tenure of the cane farmer was regarded as being generally insecure. The two Ordinances, The Sugar Cane Small Holdings Ordinance Ch. 23, No. 11, 1928, and The Rents of Small Agricultural Holdings Ordinance Ch. 23, No. 20, 1943, which operated simultaneously after 1943, failed to give protection or adequate compensation to tenant cane farmers. The need for secure tenancies in order to improve farming practices and encourage better utilisation of the land was acknowledged by the State after the recommendations of the Ward Report,⁷ and a new ordinance, No. 32 of 1961, known as the Agricultural Small Holdings Tenure Ordinance, is now in effect. The major provisions are that tenancies are to be for a period of five years, renewable for up to a maximum of twenty years; tenants can be dispossessed for failure to practice good husbandry; in cases

7. Report of the Ward committee on the security of land tenure, 1958, Trinidad.

Table 22: Tenure of farmers' holdings by classes of farmers (percentages).

Classes of farmers	Farmers				% who own entire holding
	% Estates' tenants	% Tenants of other land-lords	% Tenants of both estates & landlords		
1	22.9	52.1	4.2	20.8	
2	28.9	44.6	5.8	20.7	
3	30.4	46.9	9.8	12.9	
4	30.9	44.6	12.2	12.2	
5	30.0	42.4	14.8	12.8	
6	3.0	45.5	33.3	18.2	
7	9.1	45.5	—	45.5	
Population estimates	29%	46%	10%	15%	

of termination of tenancies the tenant will be compensated for the "unexpired value"⁸ of the permanent improvements made as well as for the crops; for certain tenancies, the loan provisions of the Agricultural Credit Bank Ordinance will be applicable. Unfortunately, there appears to have been relatively little improvement in farming techniques as a result of more secure tenure since the Ordinance has been in force. This failure can well be due to lack of integrated development of all aspects of agriculture including credit and, especially, as the work of the extension services among cane farmers seems to have been negligible (see p. 217). Generally it was found that the majority of farmers were unaware of the provisions of the Agricultural Small Holdings Tenure Ordinance.

In terms of the length of tenancies for sugar cane and other crops, it was found that most of the farmers who grew rice rented land on an annual basis, but that sugar cane lands were held for longer periods. This was also found to be the case in the Oropouche Lagoon survey of 1944-45.⁹ A few cases of farmers who were squatting on Crown Lands were found, but as far as sugar cane is concerned, this practice does not appear to be very widespread. Generally, although farmers are fearful as far as security of tenure is concerned, the Agricultural Small Holdings Tenure Ordinance has alleviated many of their fears, but the farmers are not all aware of their rights.

The farmers

Some of the major physical constraints which affect farming have been outlined, but there are some which may be regarded as partly

8. Ward Report, op.cit. quoted in TICFA, Annual Reports 1957-1959, p. 30.

9. Jolly, 1944-45, op.cit.

10. Gilbert, op.cit., p. 19.

deriving from the physical constraints and others which may be regarded as characterising the farmer rather than the holding. Reference will be made to the extent of the farmers' dependence on agriculture as a whole and especially on sugar cane. These partly derive from the physical problems. Consideration is also given to the age structure of farmers, family and household size, and the extent of illiteracy among farmers.

Dependence on sugar cane and other activities

Of 13,000 farmers analysed by Gilbert in 1932-33, only 12% were found to be entirely dependent on cane-farming and, generally, the proportion of full-time farmers showed increases in the higher production classes.¹⁰ Although in the present survey it was not possible to obtain information of this type, it is possible to infer from other information collected that even now, this proportion has not changed considerably. In 1967, only 18.7% of all farmers, or 1,842 in number, supplied more than 100 tons of cane (table 1). It is assumed that none or only insignificant numbers of those who sell less than 100 tons of cane depend only on cane for their income. In the three categories of farmers who sell above 100 tons of cane, over 20% in each of the classes do not spend any time at all on other crops (table 25) and about 30% grow 'other crops' and tree crops commercially (table 18). Most of the farmers who grow other crops are occupied on these for only three months, and only 1% are so occupied for over six months. Thus it is apparent that, while sugar cane is the main enterprise of all these larger farmers, some still have other agricultural enterprises or other sources of income. Some 19% of the three classes combined obtain incomes from other businesses or self-

10. Gilbert, op.cit., p. 19.

employment, but very few have outside occupations. In all, 83% of these three groups are self-employed either full-time on their farms or in other businesses of their own.

At best, farm incomes for these larger producers will be twice that obtained from sugar cane, but normally is only just above, for 70% of the farmers do not grow other crops for sale. If the figure of 70% of the farmers in these three groups is taken as the highest possible proportion who depend solely on sugar cane, then, globally this amounts to 13% of the cane-farming population. Even among these some obtain incomes from other sources. It still seems true, therefore, that the proportion of farmers who depend solely on sugar cane for a living has not changed considerably from that found in the Gilbert survey.

The length of time spent by farmers on their holdings, on sugar cane and on other crops also provides some indication of their dependence on off-farm income (tables 23, 24 & 25). It is apparent that the time spent on the farm increases with the size of production of sugar cane, and consequently with farm size. For all other crops the time spent is quite short for all categories and is generally less than three months. When one looks at those who are full-time farmers (table 15 col. 6) it is seen that about 38% of the farmers are occupied all the time on their farms. One sees that again the proportion increases with size of production, except for classes 6 and 7, where other businesses take up the farmers' time.

So far the discussion has applied mainly to those farmers who sold over 100 tons of cane, because these are the farmers who can possibly obtain highest incomes, except for those who also grow other crops commercially and belong to the other categories. Now an attempt

Table 23: Months spent on holdings by classes of farmers (percentages).

Classes of farmers	Months									
	0	1	2	3	4	5	6	7	8	9 & over
1	—	10.4	12.5	8.3	18.8	8.3	16.7	—	2.1	22.9
2	1.7	3.3	8.3	9.9	8.3	4.1	21.5	1.7	4.1	37.2
3	0.5	3.1	2.6	7.2	10.3	2.6	17.0	3.6	5.2	47.9
4	1.4	1.4	2.2	2.9	1.4	1.4	12.2	336	10.8	62.6
5	—	—	1.0	1.0	1.5	0.5	3.4	1.0	4.4	87.2
6	—	—	3.0	—	—	—	6.1	—	3.0	87.9
7	—	—	—	9.1	—	—	9.1	—	—	81.8

Table 24: Months spent on sugar cane by classes of farmers (percentages).

Classes of farmers	Months									
	0	1	2	3	4	5	6	7	8	9 & over
1	—	35.4	16.7	14.6	14.6	2.1	8.3	—	2.1	6.3
2	1.7	14.0	19.0	15.7	16.5	5.8	12.4	0.8	6.6	7.4
3	0.5	7.7	10.8	12.9	16.0	3.1	13.4	3.1	9.8	22.7
4	1.4	2.9	4.3	5.0	7.2	8.6	17.3	2.2	15.1	36.0
5	1.0	0.5	2.0	2.0	2.5	1.5	9.9	1.5	15.8	63.5
6	—	—	3.0	—	—	—	9.1	—	12.1	75.8
7	—	—	—	9.1	—	—	9.1	—	—	81.8

Table 25: Months spent on all other crops by classes of farmers (percentages).

Classes of farmers	Months									
	0	1	2	3	4	5	6	7	8	9 & over
1	25.0	14.6	22.9	16.7	8.3	—	4.2	2.1	4.2	2.1
2	22.3	22.3	13.2	9.1	10.7	1.7	8.3	2.5	5.0	5.0
3	26.3	12.9	20.1	18.0	9.3	2.6	5.7	—	2.6	2.6
4	18.0	11.5	24.5	25.2	10.8	2.2	6.5	0.7	0.7	—
5	23.6	7.9	29.1	20.2	11.8	3.0	3.4	—	0.5	0.5
6	36.4	—	48.5	6.1	6.1	—	3.0	—	—	—
7	72.7	—	27.3	—	—	—	—	—	—	—

will be made to look at all the farmers. If the average price paid to farmers for the period 1964-68 is taken, then the average gross return per ton was \$11.68TT (£2 8s. 8d). For 1967 the price received by farmers was \$11.21TT (£2 6s. 8½d). The average gross incomes for the separate groups is seen to be rather low for the first four classes (table 26). Even the gross return of farmers selling between 50 and 100 tons was just over half the average per capita income for Trinidad (see below). The gross income from 100 tons of cane in 1967 then, was only \$1121.00TT (£233 10s. 10d) and the average for 1964-68 was slightly higher at \$1168.00TT (£243 6s. 8d). One estimate puts the net income of a farmer growing about five acres of sugar cane (hence producing about 100 tons), using his own labour and transport, at about \$750.00TT (£156 5s.).¹¹ The average Trinidad per capita income, itself a crude measure, is \$1230.00TT (£256 5s.).¹² Thus, even a farmer producing 100 tons of cane is forced to supplement his income. Less than one-fifth of the farmers in 1967 produced over 100 tons of cane (table 1). Some of these, 0.2% or 17 farmers, produced over 1,000 tons and 0.6%, or 59 farmers, produced between 500 and 1,000 tons.

The figure of 100 tons of cane per farmer has been suggested as the minimum tonnage on which "a farmer can live at even a low or bare subsistence level."¹³ This, of course, assumes that sugar cane provides the only source of income. Nevertheless, if the suggested amount is regarded as the critical line, then, in 1967 over 81% of the farmers were compelled to supplement their incomes.

11. Rampersad, F. and Alcantara, N. "Peasant farmers in developing countries", Trinidad, 1966, unpublished.

12. Draft third five-year plan, p. 21.

13. Girwar, op.cit., p. 129.

Table 26: Average gross incomes for farmers from sugar cane for 1964-67 and 1967 by classes of farmers.

Classes of farmers	1964-67 av. production per farmer (tons)	1964-67 av. gross income per farmer(SIT)	1967 average production per farmer (tons)	1967 average gross income per farmer(SIT)
1	3.44	39.42	5.24	58.74
2	13.35	152.99	13.40	150.21
3	33.47	383.57	33.98	380.92
4	73.70	844.60	71.35	799.83
5	185.97	2,131.22	183.18	2,053.45
6	674.64	7,731.37	634.19	7,109.27
7	2,393.41	27,428.48	2,305.35	25,842.97
Population averages -	72.28	828.33	68.66	769.68

Source: Compiled from information supplied by the SMA.

As most farmers hire labour at harvest time, and the larger farmers hire labour for other activities as well (table 33), and if the costs of planting, cultivation, fertiliser and transport are taken into account, one sees that even for the larger farmers in group 5, incomes are not very high. Table 27 gives an assessment of the costs incurred in cane production for plant canes and ratoons; these figures are only estimates obtained from farmers who were willing to co-operate sufficiently with the author. No exact costings have been attempted by farmers nor any other persons, so that these figures must be used with caution. However, even if the costs are reduced, it is apparent that net income per ton of cane is very small indeed, and that between 1964 and 1968 it has been very low. In 1963 earnings were quite high because of abnormal conditions prevailing on the world markets after the Cuban crisis (figure 11). However, it is very obvious that the farmers belonging to the first four groups, that is selling up to 100 tons of cane, must search for supplementary incomes. The need is also apparent for some who sell between 100 and 500 tons. The few farmers who belong to the two highest classes, those selling above 500 tons, can earn incomes that are at or above the national per capita level. These farmers form about 1% of the total. A considerable number of farmers in all classes indicated willingness to take up off-farm work (table 28).

The survey showed that about 33% of farmers have other commercial agricultural enterprises (table 18), the proportion being slightly higher among the small producers, and overall about 38% of farmers depend on agriculture entirely, discounting those who may be occupied for less than one month in other activities. All other farmers supplement their incomes from off the farms (table 15). This table

TABLE 27.

Operations and estimated costs of production per acre.

a) <u>Plant cane</u>		<u>Estimated cost \$/TT</u>
<u>Operations</u>		
Clearing the land		25.00
Ploughing, harrowing and banking		65.00 (on sloping land 90.00)
Plants and planting		55.00
Breaking of banks (in two operations)		27.00
Fertiliser (4 cwt) including transport and application		27.00
Drainage (on low land)	Already in job	90.00 (on sloping land 15.00)
Weeding	or will go to job	25.00
Rent		10.00
	Total	324.00 (on sloping land 274.00 but additional costs for cutting and transport)
An acre so treated should produce about 30 tons. This will cost about \$5.00 for cutting, loading and transport of one ton giving an additional expenditure of		150.00
	Total expenditure	474.00
Gross return at five-year average (1964-68) of \$11.68 per ton		350.40
		- 123.60 loss

In addition some farmers cut fire-breaks around their cane plots, which normally costs \$10.00 per acre. Further costs are met with the need to 'supply' plants which have not germinated.

b) <u>Ratoon cane</u>		<u>Estimated costs \$/TT</u>
<u>Operations</u>		
Drainage		15.00
Fertiliser		27.00
Weeding and cutlassing		50.00
Rent		10.00
		102.00
Such an acre should produce 30 tons and cost \$5.00 per ton for harvesting operations		150.00
	Total expenditure	252.00
Gross return of 30 tons at \$11.68		350.40
		98.40 net return

The same additional expenses mentioned for plant cane are applicable to ratoon cane. Farmers who spend correspondingly less obtain lesser returns, as most farmers do. The cane may be ratooned for a number of years, normally 4 to 6 ratoons, after which output starts decreasing considerably. No account is taken here of expenses that may be made to control froghopper or any other pests or to treat soil deficiency other than the application of 4 cwt. of sulphate of ammonia.

size that 11.9% are in other forms of self-employment. If these are added to the proportion self-employed in agriculture, it is apparent that just under half the farmers are self-employed. All other

TABLE 28

Farmers already in or would go to full time jobs if available, by size groups.

Classes of farmers	Already in job or will go to job	Will not go to job	No Comment or do not know
1	62.5	33.3	4.2
2	52.9	42.1	5.0
3	47.4	49.0	3.6
4	40.3	55.4	4.3
5	41.4	54.2	4.4
6	48.5	45.5	6.1
7	45.5	54.5	—
Population estimates	47%	49%	4%

In occupation, but were unemployed for at least three months in 1957.

Among these the proportions are again high for the smaller producers.

In groups 1 and 2, a considerable number of these who have other businesses also own taxis. In the other groups, although some farmers own taxis, most operated small grocery stores. They have a wide variety of other types of businesses such as handicraft manufacture, joinery, and in two cases, the ownership of saw-mills. If the four lowest groups are combined, then 52% are full-time farmers and 10% otherwise self-employed, making a percentage of 42% for those dependent on their own resources. In addition, about 14% are employed on the estates, 11% by other farmers, 9% on public work projects, 10% on full-time off-farm occupations and 14% are unemployed for three months or more (this refers to 1957 only). As

shows that 11.5% are in other forms of self-employment. If these are added to the proportion self-employed in agriculture, it is apparent that just under half the farmers are self-employed. All other farmers then, or just over half, depend upon outside employment to supplement their income, or conversely, use agriculture to supplement off-farm income.

As regards other occupations, table 15 shows that 12% of the farmers are occupied for part of the year on the sugar estates. The proportion is expectedly higher in the low production categories. Some 9% work for other farmers in various tasks, from preparing the land to harvesting the cane. Here again, the proportion who work for other farmers is higher in the low production groups. The case is similar for those farmers who are employed part-time on public projects and those who are on full-time occupations. These form 8% and 9% respectively of the total. Some 13% are mainly agricultural in occupation, but were unemployed for at least three months in 1967. Among these the proportions are again high for the smaller producers.

In groups 1 and 2, a considerable number of those who have other businesses also own taxis. In the other groups, although some farmers own taxis, most operated small grocery stores. The rest have a wide variety of other types of businesses such as handicrafts manufacture, joinery, and in two cases, the ownership of saw-mills. If the four lowest groups are combined, then 32% are full-time farmers and 10% otherwise self-employed, making a percentage of 42 for those dependent on their own resources. In addition, about 14% are employed on the estates, 11% by other farmers, 9% on public work projects, 10% on full-time off-farm occupations and 14% are unemployed for three months or more (this refers to 1967 only). As

shown above, over 83% of groups 5,6, and 7 were self-employed either in agriculture or in other forms of self-employment. The inference is that farm size is the most important factor responsible for this situation.

Age structure, household size and literacy

In every production class, it was found that the highest proportion of farmers belonged to the age group 50 and over (table 29). If these farmers are combined with farmers in the 40 to 49 group it is seen that together they form over 71% of all farmers. This is not unusual in Trinidad, for if all holdings with individual holders are considered, then only 20% of all farmers are 39 or under,¹⁴ while this survey has shown a percentage of just under 39% for the same age groups. It may be true to say, therefore, that in spite of the generally high ages of cane farmers, there are more young farmers in sugar cane production than in the rest of agriculture. It is also seen that there are relatively few young farmers who belong to the three highest production classes.

About one-third of all farmers belong to households of nine or more individuals (table 30). The maximum number of individuals recorded in a single household was 21, and this household comprised five family units. A further one-third belongs to small households of five or fewer persons. These latter were normally of single family units. No great difference is shown by farmers in the different age groups in the relationship between smaller production classes and smaller households with younger farmers; though smaller producers are generally younger. Almost four-fifths of all households have single family units and 18% have two family units (table 30).

14. Agricultural Census 1963, op.cit., table 1.15, p. 6.

TABLE 29

Age groups of farmers by classes of farmers (percentages).

Classes of farmers	Age Groups			
	29 and under	30 - 39	40 - 49	50 and over
1	12.5	4.2	33.3	50.0
2	11.6	24.0	23.1	41.3
3	14.9	14.9	31.4	38.7
4	13.7	11.5	32.4	42.4
5	9.9	13.8	28.6	47.8
6	3.0	18.2	27.3	51.5
7	9.1	27.3	9.1	54.5
Population estimate ³	13%	16%	29%	42%

Table 30: Size of households and numbers of families by classes of farmers (percentages).

Classes of farmers	Number of individuals in household									Number of family units				
	1	2	3	4	5	6	7	8	9&over	1	2	3	4	5
1	10.4	6.3	14.6	6.3	8.3	14.6	—	8.3	31.3	85.4	12.5	—	—	2.1
2	5.0	9.1	7.4	10.7	9.9	7.4	12.4	10.7	27.3	86.0	12.4	1.7	—	—
3	2.6	7.2	9.8	8.8	8.8	10.8	11.3	12.4	28.4	78.9	17.5	3.6	—	—
4	3.6	5.8	2.9	9.4	6.5	13.7	9.4	9.4	39.6	77.5	18.1	2.9	1.4	—
5	1.5	3.4	11.3	6.4	5.9	11.8	9.9	12.8	36.9	71.8	24.8	3.5	—	—
6	3.0	3.0	3.0	3.0	9.1	—	18.2	9.1	51.5	60.6	27.3	12.1	—	—
7	—	—	—	9.1	—	36.4	9.1	18.2	27.3	54.5	45.5	—	—	—

It would appear that there is a fairly large potential supply of unpaid family or household labour. However, this labour is not used to any great extent (table 31). It is possible that the nature of the work and attitudes to agriculture are responsible for this. The nature of the work involved in sugar cane production is rather strenuous, especially at harvest time when most of the labour is required. To a certain extent this rules out assistance from children. Moreover, many farmers do not want their children to work in the fields. There are also farmers who may want assistance from their children, but, with the availability of secondary education, it appears that children are very unwilling to render any assistance in agricultural pursuits because of the stigma attached to these occupations (see p.232). It may be mentioned that the State has initiated a campaign against such attitudes (see p.234), but attitudes take a long time in dying. Generally, a farmer's wife will help on the holding, though not on large holdings where farmers are able to employ all the labour that they require. That most of the labour is utilised during the harvest, over a relatively short period for individual farmers, forces the farmer to use hired labour. Further, once the cane has been cut, it must be milled within a few days or deterioration takes place. Deterioration is even faster with burnt canes. Thus, although over 60% of the households are medium to large, that is with more than six individuals, the amount of unpaid labour used is not as great as would be expected.

Although illiteracy is not a very serious problem in Trinidad as a whole, it appears to be higher among the older agricultural population. The only figures available are those of the 1946 Census

Table 31: Numbers of individuals 16 years old and over and under 16 years providing unpaid help on holdings by classes of farmers (percentages).

Classes of farmers	Numbers 16 years and over					Numbers under 16 years							
	0	1	2	3	4	5 & over	0	1	2	3	4	5	6 & over
1	—	60.4	33.3	4.2	—	2.1	70.8	18.8	8.3	—	—	2.1	—
2	1.7	47.1	37.2	9.9	2.5	1.7	57.0	22.3	12.4	5.8	0.8	0.8	0.8
3	2.1	45.9	37.6	11.3	2.6	0.5	59.3	19.1	11.9	7.2	1.5	0.5	0.5
4	2.9	32.4	46.8	10.1	5.8	2.1	42.4	25.2	15.1	7.9	5.0	2.2	2.1
5	—	39.4	36.0	15.3	4.9	4.5	53.2	18.2	14.3	5.4	4.9	2.0	2.0
6	3.0	42.4	24.2	12.1	15.2	3.0	75.8	3.0	9.1	—	6.1	6.1	—
7	—	45.5	36.4	9.1	9.1	—	90.9	9.1	—	—	—	—	—

Table 31: Numbers of individuals 16 years old and over and under 16 years providing unpaid help on holdings by classes of farmers (percentages).

Classes of farmers	Numbers 16 years and over					Numbers under 16 years							
	0	1	2	3	4	5 & over	0	1	2	3	4	5	6 & over
1	—	60.4	33.3	4.2	—	2.1	70.8	18.8	8.3	—	—	2.1	—
2	1.7	47.1	37.2	9.9	2.5	1.7	57.0	22.3	12.4	5.8	0.8	0.8	0.8
3	2.1	45.9	37.6	11.3	2.6	0.5	59.3	19.1	11.9	7.2	1.5	0.5	0.5
4	2.9	32.4	46.8	10.1	5.8	2.1	42.4	25.2	15.1	7.9	5.0	2.2	2.1
5	—	39.4	36.0	15.3	4.9	4.5	53.2	18.2	14.3	5.4	4.9	2.0	2.0
6	3.0	42.4	24.2	12.1	15.2	3.0	75.8	3.0	9.1	—	6.1	6.1	—
7	—	45.5	36.4	9.1	9.1	—	90.9	9.1	—	—	—	—	—

which showed that 26% of the population over 5 years old were illiterate.¹⁵ Undoubtedly, this proportion has decreased considerably. Yet, though no question concerning literacy was asked during the survey, it was apparent that a substantial proportion of farmers had to use their thumbprints instead of signatures in their transactions with the estates. It seemed, therefore, that a high proportion of farmers, probably about 40%, are illiterate. This of course, is related to the age structure of the farming population. Undoubtedly, this has some effect on farming changes and farm management. A possible result of this was found in the number of applications for the subsidy to control froghopper damage. There are several possible reasons why relatively few farmers applied for the subsidy, but illiteracy is one of them, because of the trouble and embarrassment caused (see p.223). Age, therefore, with the greater degree of illiteracy existing among the older farmers, is one further constraint to farming development.

Capital and labour

Since no information was collected on actual incomes and expenses, except those shown on tables 11, 26 and 27, it is difficult to formulate any definite statements regarding all aspects of capital. Such information as was collected came from only few farmers (see p.161). Consideration is, therefore, given to transport or cultivating equipment owned and to the cost of cutting and transporting cane. On the question of cutting and transport, though originally two separate answers were required, it was found that, in some areas, farmers who

15. Trinidad and Tobago Annual Statistical Digest, 1967, table 11, p. 10.

hire labour for cutting and transporting cane could not distinguish between the separate costs. It was found necessary therefore, to combine the costs of cutting, loading and transporting cane (table 11). The size of households, as providing the potential unpaid labour supply, has already been discussed, but the seasonal imbalance in labour requirements will be taken into account.

Capital

Almost all farmers use mechanical equipment in land preparation and some use mechanised transport, but relatively few farmers actually own such equipment (table 32). Under 10% of farmers own a plough. For other cultivating equipment, such as mould-boards and bankers, a bare 2% own such equipment. Under 1% own lorries and trucks for transporting cane, but about 40% own carts (table 32, col. 6). About 14% own tractors, all of whom have one or more trailers for transporting cane. A few farmers have more than one tractor and there were two farmers in the largest group with six tractors each. A similar picture is shown for dusting and spraying equipment. The general trend is for ownership of equipment and transport facilities to increase with size of the production unit. This implies that those farmers who have small individual outputs have to pay the larger farmers for services such as land preparation, and transport. This provides extra income for some farmers, but has the consequence of reducing the incomes of other farmers who usually are the smaller producers.

It was found that almost half the farmers hire all their transport, and a further 11% use both owned and hired transport (table 33). As is to be expected, more than 50% of farmers in the three smallest production groups hire all their transport and very

Table 32 : Ownership of agricultural equipment by classes of farmers (percentages).

Classes of farmers	Percentages of farmers owning equipment						
	Ploughs	Other cultiv. machinery	Lorries	Carts	Tractors	Spraying & dusting equip.	
1	2.1	2.1	—	18.7	6.2	2.1	
2	2.5	—	—	27.3	6.6	5.8	
3	5.2	0.5	1.0	40.7	5.7	5.2	
4	5.0	2.2	0.7	48.9	12.9	10.1	
5	21.2	6.4	5.9	47.3	37.4	27.6	
6	48.5	27.3	21.2	27.3	78.8	66.7	
7	81.8	63.6	27.3	45.5	100.0	81.8	
Population estimates	8%	2%	1%	39%	14%	10%	

Table 33: Type and ownership of transport by classes of farmers (percentages)

Classes of farmers	Type of transport		Ownership of transport		Both (3) & (4)
	Animal (1)	Mechanical (2)	Hired (3)	Owned (4)	
1	62.5	27.1	79.2	20.8	—
2	62.8	28.1	70.2	25.6	4.1
3	58.8	20.6	54.6	36.6	8.8
4	61.2	26.6	39.6	50.4	10.1
5	43.8	39.9	15.8	57.1	27.1
6	3.0	57.6	—	63.6	36.4
7	—	18.2	9.1	27.3	63.6
Population estimates	57%	28%	50%	39%	11%

few use both hired and owned transport. This shows that in these groups, those farmers who own transport can carry all their cane (except in the case of burnt cane) because their total production is quite low. With increasing size of production, more farmers own transport, but also hire some transport either from smaller farmers who own carts or tractors, or from the larger producers who own more equipment. In all, under 40% of farmers transported all their cane. As has been shown with off-farm employment, there is a direct relationship between size of production and ownership of equipment and transport, with the smaller producers being worse off.

An estimated 57% of farmers use only animal power for transport of canes at harvest and 28% use only mechanical power either in the form of tractor-drawn trailers or lorries (table 33). The rest of the farmers use both animal and mechanical transport. Because a considerable number of farmers grow cane on gently to steeply sloping land, they may have to use two forms of transport at increased cost. In some cases, access is so difficult that cane has to be brought manually to the roadside before being put on animal or mechanical transport. Animals may provide only in-field transport, with mechanised transport being used to **move** the cane to the purchasing points, but animals may also be used to supplement mechanical transport by carrying cane directly to the scales. Where cane has to be transferred from one form of transport to another, the additional labour required is considerable, but is sometimes reduced by the larger farmers who use derricks for this process.

From the restricted account given of the equipment and transport facilities owned by farmers, it is apparent that few farmers can afford to own mechanical equipment for cultivation and

transport because of the small size of the farms.

All farmers now use mechanical equipment for land preparation, some hiring services at high cost from farmers who own the requisite machinery. In the past some of these services were provided by the estates, but this is no longer the case. It has been mooted for a considerable period that a tractor pool should be formed to provide land preparation services to farmers, but this has not come to fruition as yet.¹⁶ When small size of farms, fragmentation, marginal lands, lack of equipment, high cultivation and transport costs, and low yields come together in varying proportions, it is apparent that the effects of under-capitalisation are considerable and can be removed only when all these elements are remedied.

Labour

In spite of the fact that farms are small and households generally large, so that there is a potential supply of unpaid labour, it has been seen that most farmers, even the smallest producers, have to hire labour at harvest. Over 70% of all farmers hire labour at harvest, with the proportion hiring labour increasing with the size of production to 100% in the two highest classes, and, even among the smallest producers, more than half the farmers employ paid labour at harvest time (table 34).

A few farmers, mainly those with permanent off-farm employment, do not work on their holdings at all, except possibly in a supervisory capacity. These form about 1% of all farmers. About two-fifths of all farmers work without any assistance from individuals over 16 years

16. This is discussed in several issues of The Cane Farmer and also the MacKenzie Commission Report, op.cit., pp. 24-25.

Table 34: Utilisation of paid labour by classes of farmers (percentages).

Classes of farmers	Percentages who used paid labour for various tasks			Overall % who used paid labour
	Planting	Cultivation	Harvesting On other crops	
1	20.8	25.0	6.3	52.1
2	31.4	35.5	11.6	59.5
3	44.3	47.4	17.5	69.6
4	59.0	60.4	23.0	75.5
5	79.2	82.8	41.9	93.1
6	100.0	100.0	57.6	100.0
7	90.9	100.0	45.5	100.0
Population estimates	49%	52%	21%	76%

old, and a further two-fifths with assistance from one other person, usually a husband and wife team. Few farmers have more than one worker over 16 as unpaid assistance (table 31). It was not possible to determine the amount of unpaid labour used in terms of man-hours, partly because this requires records to be kept and partly because some of the unpaid help was from children whose productivity it is difficult to equate with that of grown-ups.

About 55% of farmers received no assistance from children between 6 and 16 years old. There is a concentration of such farmers in the lowest production class and also in the two highest classes. This is probably because the small producers have little cane anyway, and larger producers, being better off, can afford paid labour or may have children over 11 years old in secondary schools. Most of the remaining 45% of farmers obtain assistance from one or two children (table 31). Again, it was difficult to obtain estimates of hours worked by children.

It has been seen that most farmers who employ labour, do so at harvest time, either for cutting or transport or both. Some farmers also employ labour for short periods for other purposes. Just under one-half of all farmers hire labour for planting and a similar proportion hire labour for cultivation. About one-fifth hire labour for other crops and this in the past was restricted to rice, vegetables and tree crops. Those farmers who now grow tobacco must also employ labour, for it is a labour-intensive crop. However, in general, most labour is required at harvest, for it must be remembered that not all farmers replant some of their cane each year. There is generally a period of full employment at harvest time, and at times there is even a shortage; thus, a few farmers complained of labour

shortages preventing them from harvesting all their canes in 1967.

In the past labour shortages tended to be more acute because the farmers had to compete directly with the estates for labour. The estates could provide employment for longer periods at better wages and so labour was attracted to the estates. However, with the decision to introduce a system of phased mechanisation on the estates, there has been a consequent reduction in employment on the estates, and farmers may possibly benefit from this situation by the greater availability of labour. It is possible, therefore, that because farmers require higher labour inputs per acre owing to the lower level of mechanisation, an increase in the farmers' acreage, or in overall production, could help to provide some employment for field workers who are not now required by the estates. The decline in the employment opportunities on the estates may continue or may be arrested depending on the findings of a commission now enquiring into mechanisation in the sugar industry. At the present time, although there is no retrenchment of workers in the industry, few new field workers are being recruited. The present labour force is being reduced by a process of 'attrition', that is, workers who retire, resign or die are not replaced. The problems of mechanising the farming sector to any great extent are too formidable to be solved in the short term, and for some time to come farmers will continue to have high labour requirements. If their production were to increase, they will possibly have need for more labour.

In considering the seasonal element in labour needs, mention was only made of the period of great demand during the sugar cane harvest. This period corresponds to the dry months and is called in these areas the 'crop'. The rest of the year, corresponding to the

rainy months, is called the 'season', when there is relatively subdued activity. Planting of sugar cane occupies some labour then, but only about half of all farmers use paid labour for either planting or cultivation tasks, or for applying fertiliser and, then, only for short periods. These are the tasks on which unpaid labour is utilised because they are less strenuous. Some farmers who grow root crops, vegetables, legumes and rice may have sufficient work to occupy themselves and some paid labour as well, but generally, over the sugar producing lands, the rainy season is a period of relative inactivity. The districts supplying the Orange Grove mill with cane, and the Bejucal-Charlieville and Debe-Penal areas where farmers have other enterprises, employment opportunities are slightly better than in the areas where only sugar cane is grown. Generally though, labour requirements are unbalanced over the year.

Conclusion

It has been shown that by far the majority of farmers are adversely affected by a variety of physical, structural and economic constraints within the agricultural system. There are some farmers who employ methods similar to those used on the large estates, but these are usually only farmers who produce over 500 tons of cane each year and who form only 1% of the cane-farming population. For the rest, it appears that farm size is the major limitation, but their problems are multiplied when holdings are fragmented and located on lands that are marginal in respect of soils, topography and accessibility. The lack of capital resources and the inability to employ the best farming techniques make for further difficulties. It is also suggested that the pricing system, although permitting some farmers to grow a saleable crop, does lower the profitability of the

enterprise to farmers who are better located. Circumstances have been made even worse by the low prices received over recent years and the need to employ labour at high cost. This has meant that money returns per acre have been very low and, considering the characteristic farm size, the result is a low total net return. Further, because of the large number of small producers, under the present pricing system, handling costs collectively are higher than if there were fewer, but larger producers. This reduces returns and affects to a greater extent those who depend for all or most of their income from sugar cane. It appears, therefore, that even if the farmer spends more time and capital on such a low income crop, he will still not be able to obtain a reasonable income from the holding. That sugar cane can produce some return, even with minimal attention, permits the farmer to employ his resources elsewhere until such time that he thinks that the returns will be better. This eventually makes him more dependent on off-farm income. The fact that the farmer does not have a heavy capital investment in the crop, or in agriculture, does not commit him completely to work on his holding. The consequences are that there are a large number of farmers who rely mainly on off-farm income.

from non-agricultural or off-farm pursuits, such as trading, working for estates, driving taxis, or for full-time off-farm working, so that no comparison can be made of the importance of sugar cane, other agricultural and off-farm production in terms of money incomes or incomes in kind and only impressions can be given. Livestock production is another facet of production which cannot be compared with sugar cane in terms of money incomes, though the type of livestock and the purposes for which they are used can be ascertained. In this chapter, therefore, an attempt

CHAPTER V

AGRICULTURAL PRODUCTION

It is very difficult to obtain reliable data on production of crops other than sugar cane, for almost none of the farmers keep records of their transactions and these records are not available from any other source. Returns are available for cocoa, coffee and tobacco, but these crops are important to only a few cane farmers. Generally more effort is put in food crop production for subsistence uses. It is impossible to obtain estimates of this type of production on farmers' holdings unless records are kept over a long period, and no attempt was made to collect information on actual production figures or yields for food crops. The data that could have been provided would have depended almost entirely on memory and was thus judged to be too unreliable. However, the importance of these crops has been gauged through the time spent on such crops and the proportion of land devoted to them will be shown to be small. No attempt was made to measure incomes from non-agricultural or off-farm pursuits, such as trading, working for estates, driving taxis, nor for full-time off-farm working, so that no comparisons can be made of the importance of sugar cane, other agricultural and off-farm production in terms of money incomes or income in kind and only impressions can be given. Livestock production is another facet of production which cannot be compared with sugar cane in terms of money incomes, though the type of livestock and the purposes for which they are used can be ascertained. In this chapter, therefore, an attempt

is made to view the agricultural production of cane farmers within the constraints discussed previously. The treatment is, of necessity, affected by the limitations of the available data.

The production of sugar cane

All the sugar cane produced by farmers is sold to the estates for milling, except for negligible quantities used for chewing. The price received by all farmers is the same in any one year, except in special circumstances such as deductions made for burnt cane and, in a few cases, extra payments made for delivery of cane directly to the mills. The production per farmer has risen considerably and has in fact doubled since 1946, but as has been shown, most farmers are small producers (table 1). In the previous chapter it was seen that only farmers belonging to the three highest production classes have holdings that can generally be regarded as viable, and only these obtain yields that are above the mean for all farmers and above 20 tons per acre (table 12). Some of these farmers produce yields that are as high as those obtained by the estates, but by far the majority of all farmers show yields that are lower than those of the estates. There are a variety of reasons responsible for the differences in yields among the farmers and between the farmers and the estates. They are mainly related to cultivation practices, the most important of which are those of land preparation and fertiliser usage, though cane varieties, ratooning and land quality also affect production. Farming ability, capital inputs and the land are fundamental to these problems.

Cultivation practices

Very different standards of cultivation obtain among cane farmers. Larger farms adopt methods similar to those used on the estates, but even some of these and most of the smaller producers use inferior practices, owing in some cases to lack of knowledge and in others to lack of capital or both. Those who depend on the crop to a great extent utilise much labour and capital in its production. Others, mainly the smaller farmers who depend for only a small part of their income on sugar cane, regard the crop as a side-line which may repay efforts in some years, but not in others. For some of these farmers the cultivation operations are either not performed or are kept to a minimum.

Land preparation.

The main operations involved in land preparation are clearing of the land, ploughing and 'refining' or harrowing the soil, banking and draining. The amount and type of drainage required depends on the topography, and this affects the cost of this operation, being more expensive in the low-lying areas (table 27). For the small farmers, the clearing operation can be done without paid labour, but about half the farmers do use paid labour. Formerly, when the soil was prepared manually, the small farmers could also have attempted this operation without paid help, but since the early 1950s the land has been ploughed by wheeled tractors. It has been seen that less than 10% of farmers own land preparation equipment (table 32) so that most farmers must pay for such tasks. The cutting of drains and the cambering of beds are still done manually. Small farmers can carry out these tasks themselves or with unpaid family assistance. In spite of the fact that the major land preparation operations are done with

the aid of mechanised equipment, the type of equipment used by farmers is generally not as efficient as the heavier equipment used by the estates and cannot produce the same results. One of the major effects of the unavailability of suitable equipment is that the farmers who cultivate lands that are gently to steeply sloping cannot use contour ploughing as a technique to prevent soil loss, because the equipment necessary requires heavy capital outlay. Many farmers indeed are still not aware of contour ploughing as a technique through which soil loss can be prevented, though efforts have been made to disseminate such knowledge and farmers can see the technique being used on the estates in the southern areas. Thus, even though mechanised land preparation is now widespread, there are still some problems about the methods used, for low yields and soil loss are fairly widespread.

Planting

Formerly, very little systematic planting of entire plots was practiced by farmers. Once a field had been planted, gaps that appeared were usually supply-planted with new setts, so that a single field would eventually have plant canes and ratoon canes of several years in various stages of maturity. With the availability of mechanised land preparation equipment, however, this practice seems to have diminished. More farmers now plant entire plots in one operation, although supply-planting is acceptable for a few years. The actual planting operations, of cutting the setts, dropping them in rows and breaking the banks over the setts, can be done by the smaller farmers with small acreages without resorting to paid assistance. Yet, it was found that just under half the farmers in the first four groups and almost all the farmers in the remaining

three groups used paid labour for planting operations (table 34).

The time of planting is variable. Generally it is either in the harvest, when plants are available more cheaply but labour is scarce, or during the latter part of the year, when setts are obtained from more valuable cane that was cut early in the year and would have been ready for harvesting early in the following year. Thus for late-planting more labour is available, but plants are expensive, while for planting during the harvest, labour is more difficult to obtain, but plants are less expensive. Plants are obtained from the estates or from other farmers. It appeared that, although farmers did want new and better varieties of cane, no concerted attempt was made by any of the connected organisations to provide the best varieties of cane for the farmers.

Varieties

Farmers have always planted several varieties of cane and this is still the practice. On one small plot of land there may be four or more varieties grown in an intermixture. The varieties grown are stipulated by the estates on the contract agreements made with farmers. For 1967 the permitted varieties were B.H.10(12), B.34104, B.156, B.726, B.37161, B.37172, B.4362, B.4098, and B.49119.¹ That part of the questionnaire in the survey relating to varieties of cane grown by cane farmers was scrapped because in many cases farmers themselves could not say what varieties they were growing, nor what proportion of their cane was of a specific variety. One variety, the Bx or 'Crackers' variety, is specifically

1. For sugar cane varieties the letter which precedes the number usually refers to the place where the variety was bred. In the case of Trinidad, it is apparent that most of the varieties grown were bred in Barbados.

barred by the estates because it has a low sucrose content, but produces high yields of cane per acre. For this reason it is preferred by farmers. Small quantities of this variety are still grown and are mixed with other acceptable varieties in order to be sold to the millers (see p. 79).

It has been pointed out by farmers that it is unfair for the estates to stipulate what varieties farmers should grow when the same stipulations do not hold good for the estates and the farmers have no control on the varieties that are grown by the estates. This argument may have little substance for it is to the advantage of the estates to grow the best varieties. Perhaps it is slightly unprincipled for one sector of an industry to make rules which the other side must adhere to without any reciprocity, if both are to be regarded as partners or 'co-partners' in the industry (see footnote 5, Ch. 3). However, a more valid criticism is that when new varieties are available a considerable time elapses before plants of the new varieties are obtained by farmers.

Ratooning

When canes are first planted they are harvested some 12 to 18 months later as 'plant canes' or 'stand-over plant canes' or as 'one-year' or 'two-year' plant canes as they are sometimes designated. The stools are allowed to grow again and are ready for harvesting twelve months later, and the process, known as ratooning, is continued annually until returns are no longer economic (table 5).

It has been seen that on the estates the percentage of ratoons has increased over recent years because they have been able to maintain yields at economic levels. Depending on the returns, the estates may obtain five or six harvests, sometimes even more, from

ratoons, though in some cases this may be restricted to two harvests only. In the 1930s, harvests from two ratoon crops only were normal, for yields decreased markedly after that. It was not until the froghopper pest was effectively brought under control by estates in the 1950s that yields of ratoon canes increased on the estates. For most farmers yields from all canes, plant or ratoon, continued to be low.

It was difficult to obtain actual figures or even approximations of farmers' cane under ratoons of different ages. Only the larger farmers planted set proportions of their cane each year and only these had a clear idea of the ratoons they were growing. The majority of farmers did not replant their cane at set intervals, and most could not remember the actual acreages under different ratoons. The responses to this question, therefore, do not provide reliable data. The only figure that was generally obtainable was that of the age of the oldest ratoon on a farmers' holding. About 87% of the farmers are estimated to have ratoons that are sixth or younger (table 34). Only about 13% have seventh or older ratoons. It appears, therefore, that the length of ratooning is generally similar for estates and farmers, though the yields obtained by the estates are far higher owing to better cultivation practices, and especially with ratoon crops, their more efficient control of the froghopper.

It has been shown that plant canes are more expensive to grow than ratoons. With plant canes, if the farmer pays for every operation, then at best his costs will be barely covered and more usually he incurs a loss (table 27). Of course, the farmer may carry out several of the production and harvesting operations with

unpaid labour so that expenses are minimised. Even so, it is almost impossible to make a profit from plant canes. With ratoons it has been seen that much less expense is involved, for the land preparation and planting phases of the crop are not required. Yields can be kept high for ratoons, but even with a reduced yield it is still relatively easy to obtain a profit. Thus it is attractive and beneficial for farmers and estates alike to ratoon canes for as long as possible. Because the crop is one that can keep on producing indefinitely with minimum maintenance, some farmers continue ratooning for periods longer than six years. It is worth noting that 18.8% of the farmers in the smallest size group had ratoons older than the sixth, and the figures for the next three groups were 17.4%, 10.2% and 7.2%. For classes 5, 6 and 7 the figures were 17.2%, 36.4% and 45.5% respectively (table 35). It is possible that as the farmers in the lowest category do not depend on sugar cane for a great part of their income, they will be prepared to ratoon for longer periods because the small income they normally get can be derived even from older, low-yielding ratoons, without the expenses and risks to be incurred in replanting. Increasingly in categories 2, 3 and 4 farmers begin to depend more and more on incomes from cane, so that more farmers have to extract a larger share of their income from the crop. Thus fewer farmers ratoon for so long a period that the returns become negligible. They must obtain a higher proportion of their income from the land and are forced to maintain their cane at a better standard than the farmers in the lowest group, who normally can afford to wait until prices are more attractive before replanting and can accept the minimal returns from older ratoons because they have other sources of income, usually off-farm. For the three larger

Table 35: Age of oldest ratoons grown by farmers in 1967 according to classes (percentages).

Classes of farmers	No Ratoons	1st Ratoon	2nd Ratoon	3rd Ratoon	4th Ratoon	5th Ratoon	6th Ratoon	7th and older Ratoon
1	18.8	4.2	22.9	10.4	8.3	6.3	10.4	18.8
2	5.8	5.8	11.6	20.7	19.8	7.4	11.6	17.4
3	2.6	4.6	14.9	30.4	20.1	9.8	7.2	10.2
4	2.9	0.7	9.4	23.7	23.7	18.7	13.7	7.2
5	—	0.5	7.4	21.2	23.6	15.8	14.3	17.2
6	—	—	—	—	12.1	42.4	9.1	36.4
7	—	—	—	—	18.2	27.3	9.1	45.5
Population estimates	4.0%	3%	12%	24%	21%	12%	11%	13%

production categories an increasingly higher proportion have older ratoons. This is possibly owing to the fact that these farmers have more land and hence are more likely to have small acreages of old ratoons which are possibly still producing economic returns. It must be remembered that the relevant question asked was only meant to indicate the age of the oldest ratoon and not the proportion or acreage under the oldest ratoon. This information could not be obtained generally owing to memory lapses and the relatively unsystematic methods of replanting. It is also possible that the larger farms could maintain yields to an economic level on older ratoons, at least as compared to the smaller farms. Because of this, then, a higher proportion of the larger producers have ratoons that were older than the seventh ratoon (table 35). Unfortunately, a large number of farmers appear to perform little or no cultivation on ratoon cane, so that a return is obtained at minimum cost, but soil fertility is endangered and a wasteful system of land utilisation results. On the richer alluvial lands of the Caparo and South Oropouche Valleys adequate maintenance makes long ratooning quite acceptable, for costs are kept down and yields are not severely affected. There were isolated instances of ratoons that were over 20 years old in these two areas and the farmers claimed that the yields obtained were above 20 tons per acre.

Froghopper

The most serious pest in sugar cane production in Trinidad, the froghopper (*Aneolania varia saccharina*), affects mainly ratoon canes. It was seen that for the estates expenditure on control measures of this pest is the second largest single item in the overall cost of producing ratoon crops (figure 8a). For farmers the

control problem is also very important, for lack of control affects yields adversely. It was found, however, that most of the farmers whose cane suffered froghopper damage did nothing to control its effects (table 36) and even fewer of the small farmers applied control measures.

It is estimated that the cost of controlling the pest effectively is about \$34.00TT per acre, half of which is refundable by the State as a subsidy. Few farmers appear to apply for this subsidy however (see p.220). It is apparent that the risk of committing capital, even when half the cost is subsidised, is too great for peasant production of a low income crop of low yields, and that the fear of unpredictable froghopper damage encourages neglect and results in poor land utilisation. In 1967, for the first time, the State, the Cane Farmers' Association and one of the sugar estates together arranged for the aerial spraying of farmers' lands affected in the Bejucal area. It was claimed that this experiment was successful and that it would be continued. There are, however, limitations on this approach since it is necessary to have fairly large compact areas for aerial spraying to be efficient and not all farmers' cane is so located.

Fertilisers

Prior to the mid-1950s pen-manure was used when available and little artificial fertiliser was applied by farmers. In his 1933 survey, Gilbert noted that "artificial fertilisers are little known among small farmers, although facilities for purchasing them on favourable terms exist with some estates."² At the present time,

2. Gilbert, op.cit., p. 9.

TABLE 36

Percentages of Farmers who attempted to control the froghopper according to classes of farmers (percentages).

Classes of farmers	% whose cane was not affected	% whose cane was affected	
		No control methods used	Used control methods
1	64.6	31.3	4.2
2	65.3	30.6	4.2
3	68.0	22.7	9.3
4	54.7	30.2	15.1
5	51.2	27.6	21.2
6	69.7	12.1	18.2
7	90.9	00.0	9.1
Population estimates	61%	27%	12%

at all, almost all of whom belonged to the first three production categories. The type of fertilizer used is generally phosphate of ammonia, though a few farmers used super-phosphate on plant cane. Very few farmers applied lime or potash.

It was found that farmers varied not only in the amount of fertilizer they applied, but also in the time of application (see p. 197). The figure used for fertilizer applied was obtained by dividing the amount of fertilizer bought by the acreage under cane. In a few instances farmers who bought fertilizer on credit did not use all the fertilizer on their own holdings, but sold it to other farmers, so that the amount bought was not in all cases the amount applied. It is also realized that practices would vary on even one holding

however, only negligible quantities of pen-manure are used and most farmers are not only aware of artificial fertilisers, but also use them (table 37). Facilities exist for purchasing fertilisers through the estates, credit societies and the Cane Farmers' Association. Over recent years there has been a certain amount of confusion as to which of these outlets handles the distribution most efficiently and at cheapest cost. During 1967, T.I.C.F.A. supplied most of the fertilisers to farmers though, even then, the estates were supplying some farmers as well (table 38).

The major stipulation for the supply of fertiliser is that a minimum of 10 tons of cane should be supplied in the previous year. The emphasis is on the recovery of money spent for fertilisers. This effectively means that the farmers in the smallest group do not obtain such credit facilities in the following year. About 61% of farmers claimed that they obtained fertiliser on credit in 1967 and about 31% paid in cash (table 39). Just over 8% used no fertiliser at all, almost all of whom belonged to the first three production categories. The type of fertiliser used is generally sulphate of ammonia, though a few farmers used super-phosphate on plant canes. Very few farmers applied lime or potash.

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Table 37: Fertiliser usage by farmers according to classes (percentages).

Classes of farmers	None used	1 cwt per acre	2 cwt per acre	3 cwt per acre	4 cwt per acre	Over 4 cwt per acre
1	39.6	6.3	10.4	10.4	20.8	12.5
2	13.2	3.3	25.6	20.7	25.6	11.6
3	6.7	6.2	27.3	24.2	19.1	16.5
4	0.7	5.0	28.8	21.6	19.4	24.4
5	2.5	2.5	19.2	23.6	21.2	31.0
6	—	—	9.1	33.3	15.2	42.4
7	9.1	—	—	9.1	36.4	45.5
Population estimates	8%	5%	25%	22%	21%	19%

Table 38.

Source of fertiliser by classes of farmers (percentages).

Classes of farmers	Sources				No fertiliser used
	CFDs of estates	TICFA	Commercial firms	Others (friends and relatives mainly)	
1	4.2	22.9	29.2	4.2	39.6
2	16.5	37.2	30.6	2.5	13.2
3	19.1	42.8	27.3	4.1	6.7
4	19.4	58.3	21.6	—	0.7
5	15.8	48.8	31.5	1.5	2.5
6	12.1	36.4	48.5	3.0	—
7	9.1	9.1	72.7	—	9.1
Population estimates	17%	45%	28%	2%	8%

Table 39.

Fertiliser on credit by classes of farmers (percentages).

Classes of farmers	Farmers who used fertiliser		Farmers who used no fertiliser
	Credit	Cash	
1	27.1	33.3	39.6
2	52.9	33.9	13.2
3	61.9	31.4	6.7
4	74.8	24.5	0.7
5	64.4	33.2	2.5
6	42.4	57.6	—
7	18.2	72.7	9.1
Population estimates	61%	31%	8%

where a farmer may apply variable amounts of fertiliser to different fields depending on what he thinks sufficient. Generally, however, these two situations should not serve to falsify the data received to any great extent.

Some of the 8% of farmers who did not apply fertiliser in 1967 (table 37) had used artificial fertiliser in previous years, but did not do so in 1967 because of lack of capital and credit, or because they felt that their time and money could be better used elsewhere considering the small returns obtained in recent years. A small proportion of farmers, about 5%, used only 1 cwt. per acre, about a quarter of the farmers used only 2 cwt., and just over a fifth applied 3 cwt., per acre. Thus about three-fifths of the farmers used either no fertilisers or less than the recommended amount. About one-fifth used 4 cwt., and the other fifth over 4 cwt. per acre. Thus two-fifths of farmers apply adequate or more than adequate amounts of fertiliser.

Several possible reasons can be suggested for the distribution of fertiliser usage as shown in table 36. Firstly, it is likely that some farmers could not obtain fertiliser on credit nor could they find the capital in any other way and so could not obtain fertiliser, or could obtain only inadequate amounts. Secondly, the basis on which fertiliser is distributed on credit at 2 cwt. for every 10 tons of cane sold means that if a farmer is to obtain sufficient fertiliser on credit to apply the recommended amount of 4 cwt., he must have produced 20 tons of cane per acre. It has been shown that few farmers achieve these yields and, therefore, most farmers cannot obtain the required amount of fertiliser which their holdings require. Thirdly, some farmers who do have the resources to provide fertiliser lack

the knowledge to apply it properly and may apply too little or too much fertiliser. Lack of adequate farming knowledge and capital and the basis on which fertiliser is distributed on credit are contributory factors to the problem of fertiliser usage. Inadequate farming ability and the fact that many farmers depend on credit for obtaining fertiliser result in the fertiliser frequently being applied at times which would not result in the production of optimum yields. Recommended practice is that there should be two dressings of fertiliser, one soon after the plants have germinated and the other some six weeks later.³ The lack of capital and hence the need to await fertiliser supplies from the credit sources often result in the optimum periods being passed.

Other cultivation tasks

In addition to applying fertiliser, many farmers perform other cultivation tasks between planting and harvesting. Weeding and trashing are usually done though there are some farmers who do little else between planting and harvesting, besides putting dressings of fertiliser. About 84% of the farmers are estimated to do weeding manually and about 15% use both manual methods and chemical herbicides (table 40). Very few farmers use chemical herbicides only. If a division is made at 100 tons, it is seen that about 90% of the farmers in the four lowest production categories used manual methods only, while for the three groups who sell over 100 tons about 62% used manual methods, the rest using combinations of manual and chemical controls. Trashing of cane, that is the removal of dried foliage, is

3. Moosai-Maharaj, R. "The use of sulphate of ammonia in sugar cane cultivation". Paper in TICFA Annual Reports, 1957-59, pp. 83-84.

not now practiced on the estates, but it is still common among farmers. Other cultivation tasks performed include the re-shaping of rows and cutlassing, which can be regarded as part of the weeding operation. As far as labour is concerned, just over 50% of the farmers claimed that they used some paid labour on cultivation tasks such as weeding, trashing, moulding and fertiliser application. The rest used only unpaid labour. As is to be expected, a higher proportion of the smaller farmers provide their own labour for cultivation tasks, or perhaps do not have these tasks performed either by themselves or by paid labour (table 34).

Harvesting

This is the operation on which most paid labour is utilised. Some 70% of farmers employ paid labour for harvesting. Again, as is to be expected, the proportion of farmers employing paid labour increases the higher the production class (table 34). The wage rates paid are similar to those paid on the estates, and the work is usually given by 'tasks', that is a set piece of work of about one-eighth to one-ninth of an acre is given for a pre-arranged wage. Sometimes the cane cutter is paid an extra wage for loading the cane onto transporting vehicles, but the practices employed vary. The cutter may load the cane for an all-in wage or the loading may be considered as a separate operation.

The condition of the fields and the access roads are very important at this time for the carts or tractor-drawn trailers usually move over the cultivated ground and so considerable damage can be done to the cane stools, the drainage system and the bed cambering, when the ground is soft. Further, because most of the in-field transport for farmers is done by animals, the condition of the ground can make

the movement of a heavy, bulky crop almost impossible and harvesting may have to stop. It is not abnormal for this to occur in some of the more peripheral areas of higher rainfall in May or June, because the rains have caused the access roads and fields to be impassable. In the South Oropouche Valley and on the edges of the swamps, roads and bridges require improvement. Even on the main trunk roads potholes were quite evident during the 1968 harvest. The access roads are much worse; they are not paved and at times become veritable quagmires. Just under half the farmers, about 48%, complained that the condition of roads affected harvesting to some extent and about 33% claimed that the general bad conditions of the roads affected not only harvesting of cane, but other activities as well (table 41). Some attention is being given to this problem as evidenced by reports in the cane farmers' journal,⁴ but the conditions do not seem to have improved sufficiently. It was apparent during field work that the marginal nature of some farmers' holdings in terms of topography is partly responsible for this situation.

The difficulties faced by farmers are increased when they arrive at the purchasing points. The waste of man-power entailed by farmers having to wait for the greater part of a day to deliver one load of cane has been noted by several observers over the decades. The Gilbert⁵ survey and the Soulbury⁶ and MacKenzie⁷ commissions remarked on the loss of valuable time at the period when it was most needed. It was claimed by farmers that for most years up to 1967, it

4. See The Cane Farmer, Vol. 10, No. 3, and several other issues. Published by Trinidad Islandwide Cane Farmers' Association, Trinidad.

5. Gilbert, op.cit., p. 9.

6. Soulbury Commission Report, p. 44.

7. MacKenzie Commission Report, pp. 19-20.

TABLE 40

Weeding Practices by classes of farmers (percentages).

Classes of farmers	Manual weeding only	Chemicals only	Combinations
1	93.8	0.0	6.2
2	92.6	0.0	7.4
3	88.1	0.0	11.9
4	86.3	0.0	13.7
5	62.6	1.0	36.5
6	33.3	0.0	66.7
7	45.5	0.0	54.5
Population estimates	84%	Negligible	16%

TABLE 41

Road conditions in vicinity of farmers' holdings by classes of farmers.

Classes of farmers	% of farmers who consider roads to be			% who claim that road conditions affect harvest
	Good	Mediocre	Bad	
1	43.8	29.2	27.1	33.3
2	40.5	36.4	23.1	38.3
3	29.4	38.1	32.5	49.0
4	31.7	38.1	30.2	46.0
5	21.7	36.0	42.4	63.1
6	12.1	33.3	54.5	72.7
7	45.5	27.3	27.3	54.5
Population estimates	32%	37%	31%	48%

took almost a full day to sell one load of cane. Such a load may be of less than one ton if the farmer used a small animal drawn cart, as is quite normal. Various attempts have been made to organise the selling of farmers' cane more effectively, but none met with great success until the 1968 harvest when the spell system of reaping was re-introduced more successfully, having been used earlier with little success (see p.64). About two-thirds of all farmers complained of this difficulty for the 1967 harvest, but almost all farmers agreed that the 1968 harvest was the best organised that they could remember. During 1968 all the mills operated without serious breakdowns, the new machinery at the Usine Ste. Madeleine worked almost at capacity, and there was greater co-operation among farmers. These contributed to the success of the re-introduced system. Larger farm units would help in solving this problem even further, for with larger units more of the transport will be mechanised and will thus be able to deliver larger loads. It is obvious that there would be less confusion at the purchasing points if fewer farmers delivered the same amount of cane that was to be delivered by a larger number of small farmers using animal-drawn carts. None of the farmers who delivered cane to the scales located at the Brechin Castle and Woodford Lodge mills complained of waiting for long periods. The farmers supplying cane to these scales are usually the larger farmers who use mechanised transport.

Cutting, loading and carting charges eat heavily into the gross income. The expenses vary from \$4.50TT to \$7.50TT per ton for just over 60% of the farmers (table 11). The rest owned their transport and so may pay only for cutting and loading, or may even perform these operations solely with the help of unpaid labour. The type of transport used has already been discussed in the previous chapter.

The distance between the holding and purchasing point is another factor which affects harvesting. It was shown that about three-quarters of the farmers have their main cane plots within three miles of purchasing points, but there are others who are located as much as 15 miles away from a scale. The operation of the spell system meant that some scales were closed at times and that farmers were not allowed to cut their cane at anytime they chose. The result was that in some cases farmers were unable to sell all their cane at one point, since the scale nearest to their holding might have been closed before the farmers had completed their harvesting. Moreover, the widespread fragmentation that has been shown to exist means that more farmers will have plots further away than three miles from the purchasing points. The figures collected refer only to main plots. It is worth repeating that the expenses for transporting cane to the purchasing scale is borne by farmers individually, and that expenses for transport from the scales to the mills are borne collectively by farmers as set out under the price formula.

There are some other problems which are claimed by farmers to affect them adversely or unfairly. These include the standards by which farmers' cane and estates' cane are deemed fit for milling. The impression gained during the survey was that there was just cause for such complaints. It was noticed that when farmers' canes were not free of foliage and tops the farmers were made to clean the cane to an acceptable standard. This is an acceptable situation if estates' canes were similarly treated, but this was not seen to be the case, for estate cane in similar or worse condition was sent directly to be milled. A further complaint concerned the maturity of cane when it was

milled, and it seemed, especially at the end of the 1968 harvest, that immature estate cane was being milled. Immature cane has a lower sucrose content and so worsens the tc/ts ratio, which in turn affects the price paid to farmers, for the divisor in the price formula is thus raised. It is possible that the events noted at the end of the 1968 harvest were due to special conditions at that time and need not necessarily be the same every year, though these complaints have been made by the Cane Farmers' Association previously. Moreover, it is the apparent use of double standards in favour of the estates that more often than not threatens to worsen relations between farmers and estates.

Production of other crops

Although most farmers grow crops other than sugar cane, for about 80% practice intercropping of food crops with plant canes, it has been seen that about one-third of the cane-farming population appears to have other commercial agricultural enterprises. Sweet potatoes, maize, pigeon peas and tomatoes are planted between the rows of cane of the 'plant crop' in the practice of intercropping. The crops are usually short term ones which have a production cycle of four to five months. Although some regard this as a practice which affects cane yields adversely, it has been suggested by officers of TICFA and also by the head of the CFD of one of the estates, that the practice does not affect yields greatly, if at all, and also that it provides some farmers with returns, either in kind or cash, if part of the crop is sold during the rainy season when the need is greatest. It is worth noting that of the 80% who practice intercropping the highest percentages are among the smallest producers (table 42). Few of the farmers in the two largest groups practice intercropping, because it

Table 42.

Practice of intercropping by classes of farmers (percentages).

Classes of farmers	% of farmers who intercrop
1	85.4
2	82.6
3	78.9
4	84.9
5	74.4
6	39.4
7	9.1
Population estimate	80%

3. It will be noticed that there are discrepancies between tables 17 and 42 as regards the percentages of each production category having their commercial agricultural enterprises. The figures in table 42 are slightly higher because even those farmers who grow crops only for subsistence purposes but pay all any surplus are included, while these are excluded in table 17.

appears that they can afford to pay for most of their food requirements. Moreover, many of the farmers who do not grow food crops indicated that far too great a proportion of these crops was stolen, and so it was not worth taking the risk to grow such crops.

The farmers who grow other crops for sale, one-third the total, are spread fairly evenly over all the production categories, except that the largest farmers show a lower proportion and the two smallest categories show slightly greater proportions (table 43).⁸ Vegetables, root crops, legumes, tree crops and tobacco were the main crops grown for sale. As has been indicated previously, there are some crop combinations in a few restricted areas, such as Bejucal-Charlieville with sugar cane-root crops-vegetables-rice; Penal-Debe and other parts of the Oropouche Valley with sugar cane-legumes-vegetables-rice; the Orange Grove areas of Arouca, Tacarigua and Guanapo, and in the central areas, McBean, with sugar cane-vegetables; and the eastern areas of Todd's Road, Caparo, Tabaquite, Brother's Road and Rio Claro with sugar cane-tree crops-root crops. The tree crops produced are usually cocoa, coffee and citrus. In the Las Lomas, Ravine Sable and Freeport areas some farmers are growing sugar cane and tobacco, but this is only a recent development and no real pattern has emerged. It has been seen that those farmers who grow tobacco also produce food crops on the same plots and usually for commercial purposes. It will be noted that the average production

8. It will be noticed that there are discrepancies between tables 17 and 42 as regards the percentages of each production category having their commercial agricultural enterprises. The figures in table 42 are slightly higher because even those farmers who grow crops only for subsistence purposes but may sell any surplus are included, while these are excluded in table 17.

Table 43: Farmers growing other commercial crops and marketing of such crops by classes of farmers (percentages).

Classes of farmers	% not growing other comm. crops	% of farmers growing other commercial crops					
		Retail outlets			Wholesale or other outlets		
		Public market	Roadside	Wholesale at market	Wholesale at farm	Marketing agency	Other
1	60.4	16.7	6.3	6.3	4.2	—	6.3
2	61.2	17.4	7.4	5.8	5.8	0.8	1.7
3	64.9	15.5	6.2	6.2	3.1	1.5	2.6
4	66.2	8.6	5.0	7.9	7.9	0.7	3.6
5	68.0	10.8	3.0	7.4	5.4	0.5	4.9
6	66.7	3.0	—	6.1	3.0	—	21.2
7	81.8	—	—	—	—	—	18.2
Population estimates	65%	14%	5%	7%	5%	1%	3%

of sugar cane per farmer at the purchasing points in areas where there are other commercial agricultural enterprises is generally lower than for most other areas where farmers depend only on sugar cane (figure 12).

As regards the disposal of these crops, it was found that food crops, be they legumes, vegetables or root crops, were mostly sold retail either at a public market or at the roadside. About 54% of the farmers who grow other crops for purposes of sale, sold these crops in one or both of the above ways. About 37% sold crops at wholesale prices either to wholesalers at public markets, to dealers who come to buy at the farms, or to the Central Marketing Agency. About 9% sold crops through other outlets at what can be regarded as wholesale prices as well. These were mainly cocoa and coffee producers who sold their crops to licensed dealers; and tobacco producers who had an outlet in the local cigarette manufacturer (table 43). It is worth noting that the larger farmers who grow other crops commercially sold their crops through dealers meaning that the crops most likely to be grown by larger farmers were tree crops rather than food crops.

In the previous chapter, the short period of time spent by most farmers on other crops was noted. In terms of acreage also, it is estimated that of the 63,000 acres in farmers holdings, about two-thirds were under cane and about 10,000 acres, or one-sixth, were under non-tree crops, unused land, scrub and pasture and built-up land. Thus, both in terms of time spent and land devoted to non-tree crops other than cane, it appears that the main purpose for which such crops are grown by most farmers is subsistence.

Livestock

The distribution of livestock units⁹ according to size groups is shown on table 44. The total units are very small and the average number of units increases with size of production. An estimated 42% of the farmers do not have any livestock. Some of these have poultry, but poultry were not included in calculating livestock units. During the survey three farmers interviewed owned poultry farms. Most others had a few poultry, but not for commercial purposes. One-third of the farmers have only one livestock unit, and only an estimated 14% had more than five units. In his survey, Gilbert found that in the Naparima area in 1932 the average number of units, similarly calculated, were about 0.5 per holding.¹⁰ In the present survey the weighted average for all the production categories combined is 1.2 units per holding.

The type of livestock owned is usually for draught purposes or for providing milk for the family or household. It was shown that an estimated 57% of farmers use only animal transport. The animals used for such purposes, with the total number of units enumerated in the survey in brackets, were water buffaloes (241), oxen (73), mules, horses and donkeys combined (76). Only 12 units of beef cattle were returned in the survey. This is partly because cattle are not raised specifically for beef production and beef supplies may come from either dairy or draught cattle. Further, because most of the farmers are Hindus, many will not sell their cattle for slaughtering or may not claim that they raise cattle for beef production, though some may sell animals for such purposes.

9. The calculation of the livestock units is explained in Appendix 3.

10. Gilbert, op.cit., p. 37.

Table 44: Distribution of livestock units according to classes of farmers (percentages):

Classes of farmers	Livestock units								Means (units)	Std.Dev. (units)
	None	0.1-1.0	1.1-2.0	3.1-3.0	3.1-4.0	4.1-5.0	5.1-10.0	over 10.0		
1	58.3	25.0	10.4	—	4.2	—	2.1	—	0.75	1.45
2	47.9	33.9	7.4	6.6	0.8	0.8	1.7	0.8	0.99	2.11
3	46.9	29.9	9.8	6.7	2.6	1.5	1.5	1.0	1.14	2.52
4	32.4	41.0	14.4	7.2	2.2	—	2.9	—	1.23	1.58
5	31.0	32.5	14.8	5.9	6.9	2.5	5.4	1.0	1.66	2.37
6	39.4	18.2	24.2	6.1	—	—	9.1	3.0	2.51	5.10
7	36.4	18.2	9.1	18.2	—	—	—	18.2	4.55	8.04
Population estimates	42%	33%	11%	6%	3%	1%	3%	1%		

The greatest number of units, 475, were of dairy cattle. Most of the farmers use their milk supply for domestic purposes and few sell milk. Recently, however, it appears that raising dairy cattle for commercial purposes is becoming more widespread. The main contributing factors in this appear to be the existence of a milk processing plant, and government subsidies for better varieties of grasses and provision of water supplies for animals. It was noted earlier that there is very little good pasture in the sugar producing areas. The fact that there are also so many small farmers does present difficulties in the way of expansion of livestock production. The small size of holdings and their fragmented state result in the animals having to be stall-fed, at least for a great part of the time, and at other times they must be tethered in open scrub or pasture lands to feed on grasses of low nutrient status. Feed supplements are expensive and the lack of capital prevents such investment. In addition, for the smaller farmers, the size of capital investment required for livestock production is far too great to be met from their meagre resources, and the length of the production cycle also acts as a restraint. The State has acknowledged the existence of these limitations and is attempting to "take steps to increase the availability of credit to farmers (meaning all farmers) for the purchase of stock and the improvement of their holdings."¹¹ At the present time though, as far as most cane farmers are concerned, livestock production is another side-line except when the farmer owns draught animals for cane transport. A further restriction on the more widespread diversification into livestock production is that many cane farmers regard it as a side-line and are

11. Third draft five-year plan, 1969-73, p. 280.

on part-time or full-time occupations off their holdings. Unlike sugar cane, livestock need fairly constant attention. Part-time farmers will be unable to provide this. However, this problem is partly offset by the availability of family or household labour which is in fact used for these purposes. Another problem is the lack of adequate knowledge of animal husbandry, but it is planned to meet this obstacle by providing "efficient supervisory and extension services in this field."¹²

The most important aspects of livestock ownership are in the provision of draught power for farmers, followed by the supply of milk for domestic purposes and, to a smaller extent, for sale. One further point worth noting, as regards the ownership of draught animals, is that not only do they save costs of transport, but they also provide some farmers with a means of earning extra income by transporting cane for farmers or providing in-field transport on the estates. In the past, pen-manure was also used in cane and other crops, but availability and ease of application of artificial fertilisers have lessened the usage of pen-manure. Relatively few small animals such as goats, sheep and pigs are reared, the last named are also the subject of religious laws. Some farmers produce these for commercial purposes though they may not be raised on commercial lines.

Summary.

This chapter has been concerned with the general agricultural production of cane farmers. It has been shown that about two-thirds of the farmers have only one commercial agricultural enterprise, sugar cane, while the rest of the farmers have a variety of enterprises, but for

12. Ibid., p. 282.

most farmers, sugar cane is the main crop. Some three-fifths of the farmers own livestock but, except for draught purposes, livestock does not seem to form an important part of the agricultural economy. For many farmers, both livestock and sugar cane are regarded as side-lines. The smaller farmers have fewer animals and own smaller acreages on which livestock cannot be easily reared. The various constraints discussed in the previous chapter were seen to affect the cane-farming community adversely. Size of farm, fragmentation, marginal lands in terms of location, topography and soils, the lack of capital and the inability to apply the best techniques, all affect output, not only of sugar cane, but also of other agricultural production. Because of these it is understandable that yields of farmers' cane are generally lower than those obtained on the estates and yields of other crops may also be low, because these crops are similarly affected. There are other limiting factors though, which are mainly institutional. These are discussed in the next chapter.

Deriving from the historical development of agriculture, from the past systems of education or lack of education, and from the persistently low incomes in peasant agriculture, is an attitude to farming which also inhibits modernization of traditional practices. These problems do not affect the estates because these services have been provided for the estates by past administrations or by the estates themselves, and, anyway, the estates can afford better standards of management. This cannot be said generally of the cane-farming community. The problems to be discussed here, therefore, can be considered as those that form part of the general infrastructure of farming, but external to the farm, such as credit facilities, extension services and marketing, and those that are related to social and individual attitudes to agriculture of the peasant type.

CHAPTER VI

INSTITUTIONAL RESTRAINTS AND AGRICULTURAL DEVELOPMENT

In the two preceding chapters certain limitations on the development of peasant agriculture, which can be described as physical and structural, have been shown to exist. There are a number of other conditions that inhibit the progress of a community of small farmers and which can be regarded as institutional. These are related to the provision of services which were and to a great extent, at present, still are available only to estates. These services include the provision of an adequate agricultural advisory and extension system, the organised marketing of crops other than sugar cane and the supply of credit, whether directly or in the form of fertilisers or pesticides. Deriving from the historical development of agriculture, from the past systems of education or lack of education, and from the persistently low incomes in peasant agriculture, is an attitude to farming which also inhibits modernisation of traditional practices. These problems do not affect the estates because these services have been provided for the estates by past administrations or by the estates themselves and, anyway, the estates can afford better standards of management. This cannot be said generally of the cane-farming community. The problems to be discussed here, therefore, can be considered as those that form part of the general infrastructure of farming, but external to the farm, such as credit facilities, extension services and marketing, and those that are related to social and individual attitudes to agriculture of the peasant type.

Advisory and extension services

In any country there is inevitably a limit to the area that can be cultivated. This limit will be reached relatively quickly in a small island such as Trinidad with an increasing population. Once the limits of the cultivable area are reached, the only other way of expanding production is through the application of more effective managerial and agronomic practices on the limited cultivable area. Though the limits of the cultivable area have not been reached in Trinidad, the time is not too far distant when this will happen. It is the stated aim of the Government that the optimum use be made of the acknowledged limited land resources.¹ As far as cane production is concerned it is the opinion of the State that "production from peasant acreages can increase from higher yields per acre on cane farmers' holdings and from more effective control of the froghopper on both estates' and farmers' holdings."² One of the accepted requisites of agricultural development of this type is that farmers be taught new techniques which have been tried and known to be both feasible and profitable. This calls for an efficient and knowledgeable agricultural advisory service.

The survey showed that relatively few farmers obtained agricultural advice of any kind (tables 45 & 46). The two questions asked related to advice on fertiliser and other agricultural advice, whether on management or agronomic problems. No time limit was placed in the questioning as to when advice was received, so that advice received five years ago as well as more recently were all considered.

1. Draft third five-year plan, p. 264.

2. Ibid., p. 270.

Table 45: Advice received on the use of fertiliser and sources of advice according to classes of farmers (percentages).

Classes of farmers	No advice received	(total) Received advice	Sources of advice						Friends or relatives	Other
			Gov't ext. office	Estates	Fertiliser salesmen	Agric. Cr. Societies	TICFA	—		
1	93.8	6.3	—	—	—	2.1	—	4.2	—	
2	91.7	8.3	0.8	1.7	0.8	—	1.7	1.7	1.7	
3	87.1	12.9	3.1	1.5	—	0.5	3.1	3.6	1.0	
4	85.6	14.4	5.0	1.4	—	0.7	2.9	3.6	0.7	
5	79.7	20.3	5.4	1.0	0.5	1.0	3.4	4.9	4.0	
6	66.7	33.3	6.1	6.1	6.1	—	—	12.1	3.0	
7	45.5	54.5	9.1	—	—	—	18.2	18.2	9.1	
Population estimates	87%	13%	3%	1%	negl.	1%	3%	3%	2%	

For advice on fertilizer usage higher percentages received no advice among the small farmers (table 45). The proportions receiving advice increase with size of production. It is estimated that only 9% of the population got advice on fertilizers. The three most important sources of assistance were the Government's extension service, OTHER Agricultural Advice by classes of farmers (percentages).

Classes of Farmers	Received no advice	Received Advice
1	97.9	2.1
2	91.7	8.3
3	93.3	6.7
4	88.5	11.5
5	84.7	15.3
6	78.8	21.2
7	45.5	54.5
Population estimates	91%	9%

Farmers on agricultural practices are relatively ineffective. It is possible that heavy losses might have been responsible for such low figures, but if this is so then it is equally likely, though not necessarily so, that the advice received had also amounted to heavy losses and thus could be regarded as ineffective.

It has been seen that advisory and extension services for cane farmers are performed by the Ministry of Agriculture through its special cane-farming department of the extension service, by the field officers of SUGA, and by the CPOs of the sugar estates. Not related to sugar cane, but affecting some cane farmers is the work of the tobacco advisory service of a commercial firm. In addition, being in proximity to large estates, cane farmers are exposed to the modern techniques applied there, and this has the effect of a large, but

For advice on fertiliser usage higher percentages received no advice among the small farmers (table 45). The proportions receiving advice increase with size of production. It is estimated that only 13% of the population got advice on fertilisers. The three most important sources of assistance were the Government's extension service, TICFA, and friends or relatives, each of which appeared to reach about 3% of the cane-farming population. The estates, credit societies and fertiliser salesmen did not reach so many farmers, possibly about 1% each. A miscellaneous group of sources falls under 'other', but this consists mainly of farmers who claimed that they benefitted from working on the estates.

As far as other agricultural advice is concerned, an estimated 91% of farmers did not receive any advice. Again, the proportions claiming that they received no advice are generally higher among the lower production classes (table 46). It appears, therefore, that all the major agencies which claim that they have a function of advising farmers on agricultural practices are relatively ineffective. It is possible that memory lapses might have been responsible for such low figures, but if this is so then it is equally likely, though not necessarily so, that the advice received had also succumbed to memory lapses and thus could be regarded as ineffective.

It has been seen that advisory and extension services for cane farmers are performed by the Ministry of Agriculture through its special cane-farming department of the extension service, by the field officers of TICFA, and by the CFDs of the sugar estates. Not related to sugar cane, but affecting some cane farmers is the work of the tobacco advisory service of a commercial firm. In addition, being in proximity to large estates, cane farmers are exposed to the modern techniques applied there, and this has the effect of a large, but

passive demonstration unit, depending on acute observation if a farmer is to benefit.

The Cane Farmers' Association has on several occasions in its annual reports showered praises on the Government's agricultural extension service, for services rendered to cane farmers.³ Reading such passages conveys the impression that all or most farmers have received technical or other advice whenever they wanted assistance. It is accepted by the State that there is a lack of adequate staff, for it reveals that the service was faced over recent years with the problem of a "serious shortage of trained personnel from which to draw for this very important and demanding job."⁴ The State also acknowledges that few extension service field officers were available for "work outside the Crown Lands Programme",⁵ which does not include many farmers. Inadequate staffing of the service, therefore, meant that little could have been achieved among cane farmers over recent years. Though praise can possibly be attached to the work of a few officers, the service as a whole could not meet the requirements of the cane-farming population, as the survey showed.

The other two major agencies offering agricultural advice to farmers, the Cane Farmers' Association and the CFDs of the three estates, appear to offer this service only incidentally. TICFA claims that its presence and that of the extension service of the Ministry of Agriculture have "eroded"⁶ the claimed function of the CFDs of providing advice to cane farmers on agricultural problems. Undoubtedly, the impression gained during the survey, and supported to some extent by the data, was that officers of both organisations were more concerned with solving the administrative difficulties that arose.

3. TICFA, Annual Reports 1957,1958,1959. p. 56; 1960,1961,1962. p. 38, p. 62; 1963,1964,1965. pp. 16,48,80; 1966, p. 17.

4. Draft third five-year development plan, p. 245.

5. Ibid.

6. TICFA, Submission 1965, p. 96.

They were possibly better geared to this purpose than to offering advice on agricultural problems. Certainly, none of the agencies appears to be justified in making excessive claims.

One of the more fortunate occurrences of the last three years has been the work performed by an advisory service of a local cigarette manufacturer, whose interests lie mainly in tobacco production. However, the extension work connected with this seems to be more intensive and effective. Those interviewed farmers who grew tobacco, agreed generally that the assistance received in terms of financial, managerial and cultivation problems should be acclaimed. Though it is mainly associated with tobacco, the benefits of the scheme seem to pervade all the agricultural enterprises of the farmers concerned, including food crops and sugar cane.

The problem of illiteracy also affects extension work. The dissemination of literature will not be very effective in such a case. The extent of this problem is not known, but the impression gained is that it is serious enough to require special advisory and extension techniques to neutralise it. This calls for more intensive work on the part of field personnel than has apparently been performed in the past.

Subsidies

Subsidisation, by encouraging the use of better techniques in production, is one of the major incentives employed in transforming peasant agriculture and in assisting the farmer to obtain increased returns. The first widespread subsidy scheme operated in the sugar industry in Trinidad was that resulting from the deterioration of the industry during World War II (see p.39), when the Benham Committee recommended that a subsidy be paid for planting sugar cane in order to preserve the industry from extinction. At the same period, another form of incentive, that of a guaranteed price, was introduced for the

years 1944 to 1946 inclusive. The cane planting subsidy was most probably the major factor in re-establishing the industry and it was paid to both estates and farmers. At the end of the 1950s, in the country's first five-year plan, a ploughing subsidy was introduced. This subsidy was limited to small farmers, that is those who had 20 acres of sugar cane or less. This, of course, meant that well over 90% of the farmers qualified to apply for the subsidy. The subsidy was intended to increase the yields of farmers' cane by improved mechanical cultivating of farmers' lands, and by reducing the acreages of older, low-yielding ratoons. The exact nature of the contribution to higher yields made by this subsidy cannot be ascertained because no records of yields were known to exist before or after the subsidy scheme. It is to be expected, however, that if farmers' lands were more adequately prepared before planting, that higher yields should result. The fact that farmers were brought into contact with agricultural extension officers during the scheme did bring some benefit in itself and, in addition, some farmers were advised on contour ploughing in areas where this was desirable. The ploughing subsidy was brought to an end in 1965 and was replaced by a subsidy for controlling the froghopper pest. This scheme is still in operation and some data for it were collected in the survey.

Like the former ploughing subsidy, the present froghopper subsidy is meant to help the smaller farmers and is restricted to farmers whose cane acreage is 25 acres or under. The subsidy amounts to half the cost of treatment up to a maximum of £17.00TT per acre. It was found during the survey that only about one-quarter of all farmers was aware of the availability of the froghopper subsidy (table 47). It is true that more farmers were aware in those areas most likely to be affected by the froghopper, but this situation still reflects poorly on the methods of dissemination of information,

whether by the Cane Farmers' Association or by the extension services of the Ministry of Agriculture. It is estimated that three-fifths of those who should have applied were unaware of the existence of the subsidy scheme.

From table 47, it is apparent that fewer of the smaller farmers knew about the subsidy, although the scheme was supposedly designed to help these farmers especially. Since there is an acreage limit most farmers in group 6 and all in group 7 are barred from applying for the subsidy. It is also seen that the proportions who applied in each class are only a small fraction of those who should have applied. It appears, too, that not only were more of the larger farmers aware of the subsidy, but also higher proportions, who were not barred, applied for payment. It is thought, therefore, that in addition to lack of awareness, there were other factors that deterred farmers from applying for the subsidy.

It was quite noticeable during the survey that many farmers who were qualified to apply and were aware of the operation of the scheme, did not apply for reimbursement because of what they claimed to be the many difficulties placed before them. One of these is that the closing date for applications is September 30th of each year, whereas the damage from the pest may not appear until after this time (figure 8). Thus farmers whose cane suffer from a late attack cannot apply for the subsidy. One of the ingenious devices used in a few cases was for the farmer to apply for the subsidy before the closing date was passed even if there was no infestation, and only to pursue the application further if damage occurred. This is possible because application for the subsidy is in two stages. Firstly, an intention to apply is submitted, followed by a formal application for reimbursement of money after the control measures had been taken. The

Table 47: Awareness and applications for froghopper subsidy by classes of farmers (percentages).

Classes of farmers	(1) % aware that subsidy is available	(2) % who did not need to apply or could not apply	(3) % who should have applied	(4) % who applied	% of (4) from (3)
1	14.6	64.6	35.4	—	—
2	17.4	65.3	34.7	0.8	2.3
3	14.4	67.5	32.5	1.5	4.6
4	28.1	54.7	45.3	5.8	12.8
5	42.4	50.7	49.3	10.3	20.9
6	36.4	78.8	21.2	6.1	28.8
7	72.7	100.0	—	—	—
Population estimates	23%	61%	39%	4%	—

two stage application itself is another difficulty. Further, because some farmers lack the capital for the initial outlay, they are not able to apply the recommended control measures first and then apply for reimbursement, as must be done at the present time. This possibly accounts for more of the larger farmers applying for the subsidy. There is also a body of farmers who are illiterate, and though this does not necessarily prevent them from being good farmers, it does make it more difficult for them to fill out the required application forms for the subsidy. This difficulty is partly taken care of by the farmers' children who have had some education. The Cane Farmers' Association and the Government's extension services provide facilities to assist farmers, literate or not, but some are undoubtedly embarrassed to expose their illiteracy. Moreover, such an approach meant that a farmer had to go to one of two offices in San Fernando, and this costs both time and money. For the farmer who had to apply for a grant to cover several acres the cost of applying would be relatively small per acre, but for the smaller farmers who could apply for only one or possibly two acres, it may not be worthwhile. Difficulties were also met in arranging visits by extension service personnel to check that the necessary froghopper control measures had been taken, a step required before farmers are reimbursed.

It is possible that most of the farmers who sell less than 20 tons of cane think that it is not worthwhile spending \$17.00TT per acre, with an initial outlay of \$34.00TT, when total net return is very small, even though control of the pest could increase yields by up to 12 tons per acre.⁷ However, as yields are low anyway, the increase that should result from effective froghopper control is lost owing to other factors. This results in relatively few farmers in these two

7. TICFA, Annual Reports 1963,1964,1965, p. 78.

classes applying for the subsidy.

Although one must concede that the aerial spraying experiment (see p. 191) prevented some farmers from having to apply for the subsidy, this does not detract from the contention that the administrative difficulties involved, the lack of awareness, the inopportune closing date for applications, the need to find the initial capital outlay and a certain amount of indifference on the part of some farmers have contributed to relatively few farmers applying for the frog hopper subsidy. Some of these causes are reflected in the fact that three times as many farmers attempted to control frog hopper damage as applied for the subsidy (tables 36 & 47). Even if those farmers who did not qualify to apply because of the acreage qualification are omitted, the ratio still conveys the same message.

Cane farmers are also able to apply for subsidies designed to encourage livestock production, such as the planting of grasses of high nutrient status and the provision of water supplies for stock. It must be mentioned that the entire system of incentives in agriculture is being critically examined by the State to evaluate their contribution to agricultural development.⁸

Marketing of crops other than sugar cane

Many problems have been shown to exist in sugar production. They affect most stages of production up to harvesting and sale of the crop. However, the fact remains that in most years the farmer is almost assured of a market for his crop. The returns are generally low and have probably fallen over recent years when account is taken of increases in costs, but the farmers' production is disposed of through a definite marketing system. This for the farmer is important and it prevents him from diversifying into other forms of agriculture for which

8. Draft third five-year plan, p. 248.

no organised marketing exists. Recently, pigeon peas, tobacco and milk have found definite outlets and production of these has increased.⁹ For most food crops, though, there have been serious problems of disposal at reasonable prices, and this has no doubt deterred farmers from investing in such crops.

During the survey a large number of farmers indicated their willingness to diversify their agriculture providing they could find outlets for their products (table 48). It will be noted that high percentages of farmers in all production classes indicated that they would grow other crops, with the lowest proportions among the largest farmers. No doubt this shows that more of the larger farmers are satisfied with their incomes from sugar cane, or that they consider the problems of diversification too great to be worthwhile. The numbers signifying their intention to grow other crops include those farmers who already have other commercial agricultural enterprises. The increase in the production of pigeon peas, for which there is a guaranteed price, and for tobacco and milk production, is some evidence that if arrangements are made for the disposal of other products, and other obstacles are not insuperable, that farmers would be willing to grow other crops commercially.

A central marketing agency has been set up by the Government to provide adequate outlets for all crops in the domestic market and to assist in the promotion of new export crops. It is the stated aim to modernise, expand and construct rural markets in order to assist farmers in the disposal of their crops. Although a system of guaranteed prices already exists, except for pigeon peas, by the time the present survey was being done, cane farmers seemed to be little affected by the other crops for which guaranteed prices were offered (Appendix III table 6).

9. Draft third five-year plan, pp. 278-282.

The lack of planting material seemed to be the main drawback for crops other than pigeon peas and sweet potatoes, but also many farmers did not know of the system.

It has been shown that over half of the farmers who grow other crops for commercial purposes sell such crops in retail trade (table 43). For 1967, few farmers sold produce through the official marketing agency, undoubtedly because this institution was only established that year. It was left to the farmers' initiative to dispose of their crops as they thought best. The result was that many farmers complained that they were virtually chased off the streets of San Fernando and the other towns by the police when they attempted to sell their produce. This often forced them to sell goods at low prices, which in turn, did not give them any encouragement to continue producing crops for the local market.

Rapid fluctuations in agricultural prices are another factor which operates against farmers in the present system. This makes it difficult to diversify production because, for the local market, except where guaranteed prices are offered, prices fluctuate considerably.

The lack of a proper marketing system, in addition to reducing the income of the farmer, has other effects. It was noted that most of the farmers who grow other crops for sale dispose of their output in some retail method or sell to middlemen. The former practice requires that the farmers spend time away from the holding, which possibly affects production. Also, there is no guarantee that adequate prices will be received (but see above for recent developments). In times of glut conditions prices are very low and in times of scarcity very high. Because of the lack of information on current prices, the farmers selling through middlemen do not always get their fair share of the consumer prices. The result is that farmers consider that they are

better off keeping output to a level that can be easily disposed of. It was seen that praedial larceny had a similar effect (see p.109). It must be mentioned that the absence of any linkage between industry and agriculture, a feature of most developing countries, also restricts outlets and incomes from agricultural production. The absence of this linkage is also related to the existence of periods of gluts and scarcities and fluctuating prices.

There are other factors limiting the production of crops for the local market, such as size and fragmentation of holdings and the lack of expertise, but it is almost certain that, given a reasonable return from crops other than sugar cane, farmers will devote more time, land and capital to new enterprises. In spite of all the problems attached to farming, it is probable that the lack of proper methods of disposal for crops other than sugar cane is the most important factor discouraging diversification.

Credit

The provision of adequate credit facilities for a farming community is one of the key steps, which, if not taken, can jeopardise the development of agriculture. However, credit of the right type is required, for the effect of money-lenders on peasant agriculture has often been seen to be retrogressive.¹⁰ Moreover, credit must be provided for such a duration of time that it promotes rather than hinders development. In some countries specialist institutions such as co-operatives, agricultural credit societies and agricultural banks have been established to provide a service for agriculture. With few exceptions in Trinidad, co-operatives have seemingly made little headway and, except for the credit societies supervised by one sugar company,¹¹

10. Myrdal, Gunnar, Asian drama, an inquiry into the poverty of nations, Pelican, 1968, pp. 1041 and 1537-8.

11. The Ste. Madeleine Sugar Company now part of Caroni Limited.

these also seem to be relatively inactive, at least as far as cane farmers are concerned. An agricultural credit bank was formed in 1945, but this too failed to service agriculture's needs for it "tended to act more like an ordinary commercial bank using commercial banking criteria, than as an agency for agricultural development."¹²

As far as cane farmers are concerned in Trinidad, credit has been received for a long time from the estates, in the form of advances on farmers' crops or in the form of fertilisers. One of the estates, now part of the largest estate, initiated and now supervises the operation of 22 credit societies in the southern cane producing areas. Most of the farmers who belong to these societies appeared to believe that a real need is filled quite competently by them. These societies are the only credit lending agency which appeared to have some degree of supervision over the credit disbursed. For commercial banks and other lending agencies this aspect does not seem to be considered. Their safeguard is that collateral security must be produced for values in excess of the loan requirements. This effectively restricts such credit to larger farmers, and generally prevents even these farmers from borrowing money, for the risks are too great. For the cane farmer the most important sources of credit are the credit societies, TICFA, commercial banks, the estates themselves and relatives or friends. Credit from the estates and TICFA is mainly in the form of fertiliser or other inputs, and in the form of cash from other sources, with the credit societies attached to the Usine Ste. Madeleine factory seeming to provide the most organised assistance.

One of the major drawbacks of the credit available to cane farmers is that it is generally short-term. Almost all the money disbursed by the credit societies is repayable within a year, although

12. Draft third five-year plan, p. 247.

in practice this period is usually 9 months. It is estimated that over 90% of cane farmers who receive credit of all kinds have access only to short-term credit, that is, for less than one year (table 49). Very few farmers have credit for longer periods and these appear to be mainly the larger farmers, who are able to obtain credit from other sources and may be better equipped to use such credit. It is possible that many farmers may not even accept long-term credit, for by lacking the ability to use it they fear that such credit will be too much of a burden.¹³

Of the estimated 92% of cane farmers who used fertilisers in 1967, about two-thirds obtained fertiliser on credit only, and the other third obtained most of their fertilisers for cash. Some of these latter may obtain part of this input on credit, but most made completely cash purchases (table 39). This fertiliser is also given on short-term credit. It is distributed nearing the end of a harvest and the money is repayable during the following harvest. The normal practice is that part payments are deducted from the sales of cane made by farmers over the harvest period. As is to be expected, more of the larger farmers obtain their fertilisers for cash and mainly from commercial firms (tables 38 & 39). It is obvious that they have more resources available and so can buy fertilisers at the right time and this undoubtedly enhances yields. That farmers using fertilisers bought on credit suffer from the timing element has been seen to exist and is acknowledged.¹⁴

The sources from which farmers obtain fertilisers, either through credit or cash, are shown on table 38, where it is seen that in

13. McMorris, C.S. "Small-farm financing in Jamaica" in Social and Economic Studies, Vol. 6, 1957, pp. 64-65.

14. TICFA, Annual Reports, 1963, p. 13.

TABLE 48

Farmers who are growing or will grow other crops, given reasonable marketing facilities by classes of farmers (percentages).

Classes of Farmers	Will not grow other crops	Are growing or will grow other crops	No comment or do not know
1	18.8	79.2	2.1
2	19.8	76.9	3.3
3	18.6	78.9	2.6
4	15.1	81.3	3.6
5	18.7	77.8	3.4
6	21.2	69.7	9.1
7	45.5	54.5	-
Population estimate	18%	79%	3%

TABLE 49

LENGTH OF CREDIT by classes of farmers (percentages).

Classes of farmers	No Credit	Less than 1 year	1 year to 3 years	Over 3 years
1	64.6	35.4	-	-
2	53.7	43.0	0.8	2.5
3	39.7	52.6	4.1	3.6
4	25.2	71.2	3.6	-
5	19.2	71.9	4.9	3.9
6	15.2	57.6	21.2	6.0
7	36.4	45.5	18.2	-
Population Estimates	38%	56%	3%	3%

1967, TICFA was the most important supplier to farmers. Most of the fertiliser supplied by this organisation was on credit. The facilities of the estates were used by TICFA to recover money payments from farmers. Next in importance were commercial firms from which mainly cash purchases were made, followed by the sugar estates which offered credit. The same pattern would not hold good in 1968, because a loan that was normally provided to TICFA by the State was not forthcoming in that year. This would have undoubtedly left the estates as the major suppliers because of the credit facilities that they offer to farmers.

These then are the major aspects of agricultural credit that affect the greater part of the cane-farming population. There are other sources of credit, mainly from shops and grocery stores which may let their customers have food supplies on credit during the rainy season, to be paid for during the harvest of the following year. A few farmers belong to other State run credit societies. A tiny number of cane growers are full-time workers in the oil industry and these obtain loans from organisations within that industry.

The agricultural credit bank established in 1945 was intended to fill the need for a specialist institution for the disbursement of credit. This bank did not meet the requirements of the farming population. Early in 1968, however, a reorganised bank became effective. It is intended to introduce "a system of supervised credit, greater flexibility and decentralisation of operations, and more emphasis on the provision of medium and long-term credit."¹⁵ The reorganised bank is intended to service the needs of the Crown Lands Programme and initially its energies may probably be directed mainly to projects under this programme. It is hoped that the same services will be rendered to existing holdings which so far have had access only to

15. Draft third five-year plan, p. 247.

short-term credit.

It is widely accepted that for most businesses a large part of the funds for capital investment should be self-generated.¹⁶ Where incomes are low, however, as in agriculture of the peasant type, it is obvious that even if a large proportion of personal savings are made, the amount of self-generated finance is still going to be low. This means that some investments must come from external sources if improvements are to be made, even if a 'bootstrap' operation is successful. However, a 'bootstrap' operation is difficult to bring to a successful conclusion where a large number of farmers regard agricultural occupations as transitory or impermanent (table 28). In such a case, self-generated finance will most likely be channeled elsewhere.

Attitudes to agriculture

It has been said that because of the odium attached to slavery and, to a lesser extent, the indentureship system in the colonial or ex-colonial territories, most people regard agricultural occupations as lowly.¹⁷ Contributing to this were the prestige and incomes attached to white-collar or professional employment, the path taken by the educated. Education, when it became more widely available, was geared more to the needs of non-agricultural occupations; agriculture has continued to be the most important outlet for the uneducated. It is widely known that many farmers spend their capital, which could be employed on their holdings, to turn their children into doctors or lawyers. The situation became accentuated in the post-World War II period with the wider availability of educational opportunities at all

16. McMorris, op.cit., p. 87.

17. Braithwaite, L. "Social stratification in Trinidad; a preliminary analysis", in Social and Economic Studies, Vol. 2, 1953-4, p. 63.

levels. This meant that the brighter children had better opportunity to improve their educational status. These invariably sought professional or non-agricultural employment because of higher incomes and greater prestige. This left to agriculture only those who were too old to leave it, those who could not get the opportunity for better education and those who did not 'make the grade'. As far as cane farming is concerned, it is accepted by some that people normally drift into it.¹⁸ It is worth noting that plantation agriculture maintained a high degree of prestige because of the scale at which it is run, while peasant agriculture is regarded as 'dirty work'. For some people the words 'soil' and 'dirt' are synonymous. Such attitudes are a strong hindrance to agricultural development and it is obvious that change is required in Trinidad's peasant agriculture. One can note in this context an opinion that "a very important requirement for successful farming is that the prospective farmer must have a real liking for a farmer's life. He must prefer it to any other mode of life."¹⁹

In a crude way this survey indicates that this requirement is not met by almost one-half of the cane farmers in Trinidad. Approximately 47% of farmers are either already in full-time off-farm employment or are willing to go to such occupations (table 28). Expectedly, the proportions are higher in the lower production classes, but otherwise are spread quite evenly over the other classes. Though it is relatively easy to understand how such a situation has developed, the varied nature of its effects on agriculture are not as easy to follow.

While sociological factors are undoubtedly responsible for these attitudes, the various constraints outlined in previous chapters also contribute. With incomes in agriculture bearing little comparison with

18. Girwar, "The economics of Trinidad cane farming", op.cit.

19. Jamaica Agricultural Society, The farmers guide, published by JAS, 1962, p. 45.

incomes in other sectors of the economy, farmers are drawn to search for supplementary employment. With agriculture being regarded as unattractive employment, the tendency is then for the farmers to depend more and more on off-farm employment, but to retain their holdings.²⁰ The holder then cannot practice good husbandry even if he had the ability to do so under normal conditions. With farmers regarding agriculture as something to leave, possibly retaining only a part-time interest and using the holding to provide security in bad times, it is to be expected that the land will not be used to its productive capacity. The farmers so affected become indifferent to the agricultural practices employed and capital, if available, is not invested on the farms, for the farmers eventually will not depend to a great extent on the farm.

The State has acknowledged the existence of such a situation and it has planned to try to change the attitudes of the whole society, including farmers. The year 1969 was designated 'Year of Agriculture' under the third five-year development plan.²¹ The aim is to show "as forcibly as possible"²² to the country as a whole, the importance of agriculture to its economic life. Changes are also planned in the educational facet of agricultural development by training practicing farmers as well as offering vocational courses in agriculture. Agricultural training will also be expanded to all levels up to the graduate level. This new emphasis should help to change attitudes. Success, however, will depend on much more than agricultural education. When the farming sector reaches such a stage that there are more viable holdings, able to provide the farming community with reasonable incomes,

20. Dyson, Alice, "Land use and settlement in the Maracas-St. Joseph Valley of Trinidad" in Steel, R.W. and Frothero, R.M. (eds), Geographers and the tropics: Liverpool essays, Longmans, 1964 pp. 271-2.

21. Draft third five-year plan, p. 267.

22. Ibid.

then it is possible that changes would be effected more easily. This calls for better farmers, for fewer farmers or for more land, or possibly for all three. However, there is such a complex interaction between all facets of agricultural development that progress can be arrested by failure in any one. A change of attitude of both the society as a whole and farmers themselves, should create a more amenable atmosphere for development. A change should result in more capital and better equipped personnel being encouraged to enter agriculture, something that has never happened in the past.

related and, intuitively, connections were suggested. The striking features of all the variables considered were those related to size of farm and size of sugar cane production. In this chapter, the most important aspects of peasant sugar cane production, such as the characteristics of the farm, those of the farmer, total output, institutional and organisational assistance, for which suitable data were obtained, are treated with the multivariate statistical technique of factor analysis. Through this it is hoped to test the hypothesis that size is the most important factor influencing cane farming.

According to R. J. Rensel, the technique of factor analysis is "a means by which the regularity and order in phenomena can be discerned" and that "it makes explicit and more precise the building of fact-linkages going on continuously in the human mind."¹ Rensel further states that not only can factor analysis manage a large number of variables, but that it can also "compensate for random error and invalidity, and disentangle complex interrelationships into their major and distinct regularities."²

1. Rensel, R.J. "Understanding factor analysis" in the Journal of conflict resolution, Vol. 11, No. 1, p. 162.

2. Ibid.

CHAPTER VII

THE FACTORS AFFECTING PEASANT CANE FARMING

In the last three chapters, the major characteristics of peasant cane farming were discussed, but no systematic statistical analysis was done. Certain of the variables seemed to be closely related and, intuitively, connections were suggested. The striking features of all the variables considered were those related to size of farm and size of sugar cane production. In this chapter, the most important aspects of peasant sugar cane production, such as the characteristics of the farm, those of the farmer, total output, institutional and organisational assistance, for which suitable data were obtained, are treated with the multivariate statistical technique of factor analysis. Through this it is hoped to test the hypothesis that size is the most important factor influencing cane farming.

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1. Rummel, R.J. "Understanding factor analysis" in the Journal of conflict resolution, Vol. XI, No. 4, p. 462.

2. Ibid.

The correlation matrix

One of the basic requirements of factor analysis is the identification of interrelations among the variables. An examination of the matrix of correlation coefficients gives some idea of the relations that exist between variables (Appendix V, table 2). These relationships may be causal and apparently without complications, but may not necessarily be so. Only 18 of the 666 values on the matrix are above the absolute value of 0.5. The highest correlations are between the size variables, that is, total farm acreage, sugar cane acreage and sugar cane production. Another group of related variables which show high correlations, are those regarding time spent on the farm and the time spent on sugar cane production. All of these show high positive correlations, emphasising the importance of sugar cane on the holdings. The vast majority of values are low and lead one to agree with J. Henshall's conclusion on Barbadian peasant agriculture that the low values of the coefficients "are suggestive of the diversity of peasant agriculture."³ This is in spite of the fact that one crop, sugar cane, is grown in all the farms being considered in both Barbados and Trinidad. In the Barbados survey, on average, the proportion of land on a holding under sugar cane was just over two-thirds,⁴ and in the present survey, just under that proportion.

Factor analysis of the variables

The basic variables are made up of two parts; one, the common variance represents that portion of the total variance which correlates with other variables; the other is the unique or specific variance

3. Henshall, J. D. "The demographic factor in the structure of agriculture in Barbados", in Transactions and Papers of the I.B.G. 1966, Publication No. 38, p. 188.

4. *Ibid.*, p. 185.

In this study, each stratum was first considered separately and it was found that although the variables in each case were not falling in identical patterns, the same general set of factors emerged in each stratum. It was felt, therefore, that if all the strata were pooled it would serve the purpose of condensing the results without great fear of creating false relationships. The factor loadings for all the variables in each strata, individually and pooled, are given in Appendix V, tables 3-10. Factor analysis is, therefore, used here to treat a large number of variables in order that any regularity that exists may be discerned. It is used also in order to state more explicitly and precisely the relationships which have already been discussed empirically.

The variables

The variables used are all derived from the sample survey of cane farmers. It was previously noted that no information was collected on money incomes and expenditures for farmers interviewed, so that these variables form no part of the analysis. However, variables covering most of the other dimensions of cane farming such as farm size, sugar cane production, tenure, agricultural credit, advice, occupations and other crops are included (see Appendix V, table 1).

The technique is based on the assumption that the variables relating to a class of objects should correlate significantly, one with another. It is assumed further, that the correlations reflect the existence of common factors among the objects. These common factors are fewer than the number of variables for describing the objects.

3. Fruehster, S. "Introduction to factor analysis", Van Nostrand, New York, 1924, p. 43.
 4. Russell, R. S. "The theory of factor analysis", p. 472.

involved in each variable which does not correlate with any other variable.⁵ The principal components were found and then rotated to an orthogonal position at which they remained uncorrelated, in order to make the factors more meaningful. The figures for the percentage of total variance explained by any one factor measure the amount of information in the original matrix that can be reduced to a pattern. According to Rummel, "it measures a pattern's comprehensiveness and strength."⁶ In this work, it is seen that only a relatively low percentage of the total variance is accounted for by the factors considered to be meaningful. This low percentage is possibly due partly to the size of the data matrix and minor variations in the sample, since farmers covered in the survey vary greatly in their characteristics and practices; and partly to the fact that the farmers were spread over a wide area over which differing conditions prevail, contributing to the diverse responses of the farmers. These both possibly result in relationships that are rather complex and cannot be comprehensively reduced to simple patterns.

The original 37 variables were found to produce 11 factors accounting for 62% of the total variation. The first two factors account for 23% of the variation, after which the percentages decline sharply (Appendix V, table 3). It is realized that the results obtained in such an analysis depends on the variables that are used, so that one must always have a reservation that the analysis can produce different results if other variables are fed in. However, if those that are considered the important variables are used in a series of analyses, it would be expected that these will contribute to the strongest factors in most cases. It must be noted, therefore, that at the base

5. Fruchter, B. "Introduction to factor analysis", Van Nostrand, New York, 1954, p. 45.

6. Rummel, op.cit., p. 472.

of the analysis there is a great measure of subjective judgement as to which variables should be used. A further limitation is the availability of usable data. Moreover, previous knowledge of the problem is used in order to arrive at meaningful interpretations. This also entails a certain degree of subjectivity, but within the constraints imposed by the factor matrix loadings. It will be noted that in some cases loadings that are relatively low are also listed. It must be made clear that it is realised that any implications drawn from these appear to be reasonable explanations and do not rest on the strength of the loadings.

Interpretation of the factors

Factor I

<u>Variables with:</u>	Positive loadings	Negative loadings
Sugar cane acreage	0.886	Intercropping -0.223
Total acreage	0.874	
Tons of sugar cane sold, 1967	0.847	
Ownership of tractor	0.821	
Ownership of cultivating equipment	0.756	
Ownership of plough	0.682	
Man-months of paid labour employed	0.523	

This factor can be regarded as a size factor because it is associated with a number of primary variables that are related to size. This size factor accounts for 14% of the total variation. Sugar cane acreage, total acreage and amount of sugar cane sold are the variables related to size and which have the highest loadings. This factor also shows, as would be expected, a direct relationship between size of farm and the ownership of mechanised equipment, as well as the number of man-months of paid labour employed. An inverse relationship exists between the variables related to size and the practice of intercropping. This variable shows the highest negative loading, although it is quite low. The practice of intercropping by smaller farmers has been noted

earlier (table 42) and leads one to conclude that the larger the holdings, the less likely it is for the farmer to grow crops under this system of production.

Factor II

Variables with:	Positive loadings	Negative loadings
Months spent on farm	0.879	Main occupation -0.635
Months spent on sugar cane	0.797	
Full-time farmer	0.758	
Ownership of transport	0.358	

This factor can be called an occupation factor and it accounts for 9% of the total variation. The variable with the highest loading is that of months spent working on the farm. There is also a high loading on the time spent on sugar cane which shows that this crop is the most important one. Main occupation is shown inversely related because the variable was coded on a binary scale, in such a way that 0 was regarded as agricultural and 1 as non-agricultural occupation. Thus agricultural occupation has a high loading and consequently, so too does the variable relating to whether a holder claimed to be a full-time or part-time farmer. Ownership of transport has a low, but still possibly significant positive loading on this factor. It was shown that, although more full-time farmers owned transport, many still have to use hired transport, and this probably accounts for relatively low loading.

Factor III

Variables with:	Positive loadings	Negative loadings
Sugar cane main crop	0.684	Months spent on other crops -0.753
		Growing other commercial crops -0.691
		Acreage of non-tree crops -0.616

This factor accounts for 6% of the total variation and can be regarded as a cropping factor, because the variables loading highly are all related to sugar cane and other crops grown commercially. The

highest loading comes from the length of time spent on crops other than sugar cane. This variable is seen to be directly related to the growing of other crops commercially and the acreage under crops other than tree crops and sugar cane. The only variable with a high positive loading on this factor is that denoting whether or not sugar cane is the main crop. As seen under Factors I and II, in which sugar cane acreage and time spent on sugar cane had high loadings respectively, here too, it is seen that sugar cane dominates the agriculture and borders on monoculture.

Factor IV

<u>Variables with:</u> Positive loadings		Negative loadings	
Ownership of cart	0.235	Transport by animals or mech.	-0.714
		Cost of cut-load-transport/ton	-0.655
		Distance of main sugar cane plot from purchasing point	-0.562
		Man-months of paid labour employed	-0.290

The fourth factor can be regarded as a transport factor because it has the highest loadings from distance, type of transport and cost of transport variables. This transport **factor** accounts for 5% of the total variation. The variable with the highest loading is that of type of transport showing the importance of animal transport for the majority of farmers. This is directly related to the cost of cutting, loading and transporting the cane over shorter distances. The highest positive loading is from the primary variable, ownership of animal drawn carts. This shows, therefore, that ownership of carts is related inversely to the cost of transporting the cane. A low, but possibly still significant negative loading, is shown by man-months of paid labour employed. All the variables with high loadings on this factor indicate that the farmers who own carts are within relatively short

distances of purchasing points, have lower expenses for cutting and transporting their cane, and employ fewer man-months of paid labour.

Factor V

<u>Variables with:</u> Positive loadings		Negative loadings
Froghopper infested acreage	0.685	nil
Froghopper subsidy awareness	0.651	
Weeding practices	0.557	
Number of fragments	0.493	
Man-months of paid labour	0.382	
Hundredweight of fertiliser per acre	0.361	
Acreage of plant cane	0.345	

The fifth factor accounts for 6% of the total variation and may be identified as a cultivation factor. The two primary variables with the highest loadings on this factor are the incidence of frog-hopper damage and the awareness of farmers that control of such damage is subsidised. These indicate that the farmers with acreages infested with froghopper are more likely to know about the availability of the subsidy. However, because weeding practices and fragmentation also have high loadings on this factor, and it is known that the larger farmers have more fragments of land and use a combination of chemical and manual methods of weed control, it seems that awareness of the subsidy is greater among the farmers with large holdings. This is supported by table 46. Other primary variables with high loadings on this factor are man-months of paid labour employed, fertiliser application and acreage of canes planted in 1967. All these variables are indicative of large holdings.

This factor, a livestock factor, accounts for 5% of the total variation. Ownership of a cart has the highest negative loading on this factor and this is related to the use of hired transport by farmers who do not own carts. But both variables, carts and ownership

Factor VI

<u>Variables with:</u>	Positive loadings	Negative loadings
Size of household	0.769	Cost of cut-load-transport -0.192
Agricultural workers in H/h	0.691	
Number of fragments	0.308	

This factor can be called a household factor. It accounts for 4% of the variation and is characterised by high loadings from the primary variables, size of household and the number of agricultural workers within a household. Generally, most of the agricultural workers in a household contributing labour to the holding belong to that household, but there are some who are agricultural workers on the estates and others who perform tasks for farmers. Number of fragments also seems to be related to size of household, but not very strongly. The variable with the highest inverse relationship is the cost of cutting, loading and transporting cane. That there is an inverse relationship indicates that costs for such farmers, with large households, are lower, because of the amount of unpaid labour used. However, the loading is not very high, which possibly shows that the labour pool provided by the large households is not fully used or, that, because of the nature of the harvest, when the cane has to be sold relatively quickly, there is also the need for paid labour or for hired transport.

Factor VII

<u>Variables with:</u>	Positive loadings	Negative loadings
	nil	Ownership of animal cart -0.855
		Transport hired or owned -0.598
		Livestock units -0.460

This factor, a livestock factor, accounts for 5% of the total variation. Ownership of a cart has the highest negative loading on this factor and this is related to the use of hired transport by farmers who do not own carts. That both variables, carts and ownership

of transport, are not each loaded exactly as highly as the other, is accounted for by the fact that larger farmers own mechanical transport, and they may also have to hire transport. Livestock units are directly related to the ownership of carts and use of hired or owned transport. This indicates, as has been suggested previously (see p. 211), that animals are important for draught purposes.

Factor VIII

<u>Variables with:</u> Positive loadings		Negative loadings	
Main occupation	0.233	Fertiliser advice	-0.623
		Intercropping	-0.508
		Agricultural Credit	-0.378
		Froghopper subsidy awareness	-0.287

This factor accounts for 3% of the total variation and can be called a services factor. The variable with the highest loading on this factor is the receipt or non-receipt of advice on the use of fertilisers. This variable has a high negative loading of -0.623. Two other primary variables related to the provision of facilities have high loadings here. The availability and use of credit and awareness of the froghopper subsidy both show negative loadings. Intercropping also has a high negative loading, while the highest positive loading, of only 0.233, comes from non-agricultural occupations. This possibly indicates that farmers who are mainly in non-agricultural occupations, who have been shown to be generally smaller producers, are not likely to obtain agricultural credit, advice or information, and are also less likely to practice intercropping owing, possibly, to lack of time or the little time spent on the holding.

Factor IX

<u>Variables with: Positive loadings</u>		<u>Negative loadings</u>	
Factor IX	nil	Average yield per acre	-0.785
<u>Variables with: Negative loadings</u>		Hundredweight of fertiliser per acre	-0.648
Factor IX	0.787	Agricultural credit	-0.236
		Tons of sugar cane sold, 1967	-0.232

This factor accounts for 4% of the total variation and can be named a yield factor. All the variables loading highly on this factor do so negatively, with the highest loading from the variable, average yield per acre in 1967. The variable that is closely and directly related to average yields per acre is the application of fertiliser. It was noted earlier that smaller producers were less likely to obtain fertiliser on credit, and this is perhaps further indicated in this factor by negative loadings from agricultural credit and tonnage of sugar cane sold. The major feature, therefore, is that the smaller producers do not obtain fertiliser on credit, apply less fertiliser per acre, and consequently obtain lower yields.

Factor X

<u>Variables with: Positive loadings</u>		<u>Negative loadings</u>	
Ownership of lorries and trucks	0.552	Age	-0.699
Distance of main sugar cane plot from purchasing point	0.368		

This factor accounts for 3% of the total variation and is the only factor in which the variable, age, has a high loading, a negative one of -0.699. It may be coincidental that this should be related to ownership of lorries and trucks, but the pattern emerges of the younger farmers owning such mechanised means of transport. This may indicate that the younger farmers would prefer these forms of transportation and are likely to move away from the more traditional forms of transport, so that this can perhaps be regarded as a progressiveness factor. The other primary variable with a high positive loading is a

distance variable and is directly related to use of mechanised transport.

Factor XI

<u>Variables with:</u>	Positive loadings	Negative loadings
Tenure	0.717	Road conditions -0.649
		Livestock units -0.228

This factor accounts for 3% of the variation and can be regarded as a tenure factor. Complete ownership of the land is inversely related to road conditions. However, although road conditions are shown with a negative loading, this is only due to the coding applied to road conditions, with 0 being regarded as good. Thus, it is apparent that those farmers who have the best tenure are also favoured by road conditions. The farmers with the best tenure rights are usually the larger farmers. Possibly one can infer, therefore, that farmers with smaller holdings usually have worse tenancies and are serviced by poorer roads. The variable, livestock units, shows a negative loading here, possibly accounted for by the larger farmers using better roads are likely to own mechanical transport, and will have few livestock units. This feature refers only to those larger farmers whose holdings are located near the better roads and hence near dense settlement. Other large producers generally keep livestock, for it was noted that the mean livestock units owned by farmers increase with size of production.

Conclusion

The factor analysis of the variables emphasises the importance of the size factor in peasant cane farming in Trinidad. This factor is not only the most strongly identified, but it also accounts for more of the total variation than any other factor. It would seem, therefore, that size of holding is the most important factor influencing cane farming, and that this type of agriculture would benefit most from an

increase in the size of farms. Second to this is the need for a greater amount of time to be spent by farmers on their holdings. It is worth noting that, whereas fragmentation is shown to be a strongly identified factor in Barbados, it is not so prominent in the present survey, in spite of the fact that the average number of fragments per holding for Trinidad cane farmers is greater than that for Barbadian farmers. It is also noticeable that the last six factors are not strongly identified, showing only two loadings of ± 0.5 and over. This may be owing to their small relative importance as compared to size, or because all aspects of the subject have not been adequately covered. As was mentioned above, reservations must be held as regards the subjective element in factor analysis. However, in several reports, drawn up on empirical lines, size of holding has been regarded as being of great significance, and this study has shown that it is the most important factor.

On several aspects of agricultural development. In the previous chapter it was seen to be the strongest factor influencing cane farming. It is realized that little has been said about differences characterising farmers in various parts of the sugar belt, except where different crop combinations and the effects of settlement patterns were discussed. These distributions were considered only where evidence from the land-use map, or other source, supported that from the questionnaire survey, for it was noted that the information collected at each purchasing point was statistically too scant to stand by itself. Divisions were made areally into large groupings of data at several purchasing points, but no specific differences emerged on the basis of such areas. No matter where the larger farms were located,

CHAPTER VIII

CONCLUSION

In this chapter little attempt is made to summarise this thesis systematically for such a purpose was partly filled by the previous chapter. The discussion will be restricted to the effects of smallness of size of cane farms and their location. Some attempt is also made to discuss the circumstances which result in a system of virtual monoculture and the constraints on diversification. Opportunity will also be taken to indicate aspects of cane farming that require closer investigation and some of the possible implications of change.

The main task set in the study was to illustrate that size of holding is the major factor affecting cane production in the peasant sector of the industry. This was demonstrated by the influence of size on several aspects of agricultural development. In the previous chapter it was seen to be the strongest factor influencing cane farming. It is realised that little has been said about differences characterising farmers in various parts of the sugar belt, except where different crop combinations and the effects of settlement patterns were discussed. These distributions were considered only where evidence from the land-use map, or other source, supported that from the questionnaire survey, for it was noted that the information collected at each purchasing point was statistically too scant to stand by itself. Divisions were made areally into large groupings of data at several purchasing points, but no specific differences emerged on the basis of such areas. No matter where the larger farms were located,

they always showed similar characteristics and the influence of size of holding seemed to be stronger than that of location. This may be partly owing to the fact that, generally, farmers' holdings are peripherally located and may be similarly affected by location. Hence, it was thought that it was not worthwhile to pursue the description of such differentiation for its own sake.

Areally, the main distinction was made between those areas in which environmental and economic conditions gave farmers the opportunity to grow sugar cane in combination with other crops and those areas in which sugar cane was the only commercial agricultural enterprise. Thus, although it was seen that variation in this sense did occur and was diagnosed, and that location is an important aspect affecting farming, size of holding appeared to be a far stronger influence.

The size structure of peasant cane farming is the main factor inhibiting the development of viable units of production, able to support a fully-employed farming population at reasonable standards. It was seen that size of holding had a direct relationship with use of fertiliser and yields per acre. Ownership and use of mechanised transport and cultivating equipment were also seen to be directly related to size, with about 10% of the farmers, mainly the larger ones, owning such equipment. The actual sale of cane was made more difficult by the existence of a large number of small producers. The difficulties encountered in the disposal of the cane affect the total production costs adversely, though costs and profitability are also related to the amount of own or paid labour employed, the cultivation practices employed and the peripheral location of farmers' holdings in relation to the mills. The survey further showed that extension services, credit disbursement of the right type and marketing facilities for crops other than sugar cane were inadequate and inhibited

development. It can be argued that the extent of the problems posed by the existence of a large number of small producers seem to make it more difficult for these three institutional functions to be carried out effectively, although it appeared that the facilities themselves were inadequate.

The high incidence of part-time and spare-time farming is also related to size of holdings. There is, however, another factor which, while it does not cause non-full-time farming, at least permits it. This is the fact that sugar cane is a crop that can tolerate poor husbandry and lack of attention, yet still produce a small return, especially with ratoon crops. While money returns are low from sugar cane, farmers tend to spend little time and money on the crop. They continue to work in other forms of employment and only when returns are more attractive is greater attention paid to the crop. While this results in poor utilisation of land resources, as far as the farmers are concerned, the response is one which results in a more economic use of their labour. This, of course, is most applicable to those farmers whose holdings cannot sustain them even at the best of time.

Monoculture and diversification

By far the most important crop grown on farmers holdings is sugar cane which occupies about two-thirds the total area of farms, holds the position of main commercial enterprise on over nine-tenths of the holdings, and is the sole commercial crop for about two-thirds of all farmers. **Partly** responsible for this importance is the fact that most of those who grow the crop have had traditional contact with it. It must be remembered that most of the inhabitants of the island can trace their settlement in this part of the world to the fulfillment of the needs of sugar cane agriculture. However, the factor that appears to be even more important is the fact that sugar cane is a

marketable commodity that can be exchanged for money incomes.

Whereas it is realised that environmental factors control agricultural production to a great extent, it is known that the same conditions that exist in the cane belt can support a variety of crops, yet, because sugar cane is marketable and readily disposed of, it is most widespread. The nature of the crop as outlined above is also partly responsible for its production under a peasant type of commercial monoculture.

An important aspect of farming changes in the present-day Caribbean is whether farmers should depend on one crop, historically a commercial crop for a metropolitan market, or whether they should diversify production with a local and regional market in mind, while still contributing to export agriculture. Diversification has been stifled in the past, except in a few areas where special conditions existed. Even in these areas, such as the edges of the two western swamps, sugar cane appears to have become more widespread during the post-war period at the expense of rice and root crops (figures 29 & 31). The lack of organised markets for crops other than sugar cane effectively barred the emergence of other commercial enterprises. Even in those areas where a measure of diversified agriculture is practiced, farmers indicated that disposal problems posed severe limitations on the expansion of other enterprises.

There are other factors which inhibit diversification. Size of holding, because of the physical limitation of the amount of land available, also prevents diversification. The production of several crops on a small holding presents the possibility that each of the enterprises will be run un-economically and that the farmer will have to find a variety of outlets which are not organised at the present time. Fragmentation also prevents diversification because of the more

at reasonable prices. With a target production declared and share of

likely loss of food crops through larceny which is an acknowledged problem in Trinidad.

A further aspect of diversified cropping patterns is the need for farmers to learn techniques for raising crops that may be completely new to them. The developments noted with tobacco showed that farmers are willing and able to learn new techniques if money returns are attractive. In considering new crops also, the practice of non-full-time farming must be borne in mind. Tobacco-growing or livestock-rearing demands more intensive attention so that part-time or spare-time farming acts as a hindrance. Such agricultural activities demand that more time be spent on the holdings by farmers. To a certain extent, the existence of large households and families is helpful in permitting holders to work in off-farm employment, while someone in the household is able to pay attention to the needs of the holding. If incomes are improved from a diversified farming, as compared to the present system, it is probable that farmers will find it attractive to spend more time on their holdings. Diversification, therefore, should be attempted only if its effects are beneficial to the farming population. If diversification is to be encouraged it must not be for the sake of diversification, but in order to assist in the development of farming systems that are feasible and profitable.

On individual holdings, if diversification is to take place, it was seen that this must be at the expense of sugar cane. Globally, though, diversification seems to be attainable without the contraction of sugar cane. In this context it is possible to suggest that targets be set for sugar production and for the proportions to be supplied by farmers and estates. The target has to be fixed in the light of available outlets under the Commonwealth Sugar Agreement, United States' quotas, local requirements and other possible outlets that can buy sugar at reasonable prices. With a target production declared and share of

production decided, development can be directed more purposefully.

It is worth noting that the suggestion of S. M. Gilbert in 1933 (p. 8) has still not been implemented and farmers continue to voice fears from time to time that they are being pushed out of the industry.

Undoubtedly, the estates have increased their share of production in the most recent period through increasing both the acreage under cane and yields per acre. Some farmers have increased yields, but generally in the peasant sector low yields were obtained, remaining at about levels reported in the Gilbert and Benham committee reports of 1933 and 1944 respectively. Increased yields on farmers' holdings, if attained, can provide considerable expansion. If they are brought up to the levels of the estates, then, from the existing acreage under cane, sugar production can be increased by over 40,000 tons, or over 15% of output in recent years. In other words, this is assuming that on the estimated 42,000 acres under farmers' cane, yields will increase from the average of 17 to 18 tons to 28 tons per acre at a tc/ts ratio of 10:1. The stated aim of the government is that expansion of export crops with precarious marketing problems, should be by increasing yields per acre and not by increasing acreages under such crops, so that increasing yields on farmers' holdings is one way of achieving this, without the need to bring new areas under sugar cane. Such areas can be used for production of other crops.

At the present time a land capability survey is in progress and, from the information obtained, the most suitable areas for growing sugar cane will no doubt be found. With the prospect that sugar cane production can be increased without increasing the sugar cane acreage, and information obtained from surveys of other agricultural enterprises, it is possible that target productions will be set for food crops when the land best suited for such enterprises is demarcated. It may be noted that food crops are becoming important not only for the local

market, but also for a regional market since the initiation of the Caribbean Free Trade Area (CARIFTA).¹ With the organisation of markets for food crops for the local and regional areas, the possibility of developing a profitable diversified agriculture does not seem too remote.

Implications of change

In the past, agricultural development was geared to the demands of metropolitan interests and farmers aped in a crude manner the estates' system of monoculture. Future development will depend more upon the institution of government policies which will take into consideration the purpose of agriculture in terms of social and economic progress of the society. This type of development is already in progress, for the recent Town and Country Planning Act makes provision for a detailed land-use plan based on the afore-mentioned land capability survey. This is to facilitate "the zoning of economic activities with a view to the best use of physical space having regard to both economic and social criteria."² Planning of this type is expected to regulate the competition between agricultural and non-agricultural users of land. This concept was developed further in the Third Five-Year Plan 1969-73, when regional planning areas were designated.

Past attempts at improving agricultural practices were usually piece-meal and made in times of stress. At the present time there appears to be a more comprehensive approach and some attempt is being

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1. CARIFTA is a free trade area concerned with abolishing custom duties, quota provisions and other restrictions on trade between the participating countries. The participants were all formerly British territories and are Antigua, Barbados, Guyana, Trinidad, the Windward and Leeward Islands.
 2. Draft second five-year development plan, p.15.

made to understand the interaction of the multiplicity of factors which affect farming. The nature and consequences of such interactions must be understood if peasant agriculture is to be developed in such a way that it becomes efficient and possibly able to use the land at an optimum level. There is, therefore, need for research into farming systems that are in harmony with local conditions. Development must aim to set up farms that are viable, producing incomes that are comparable to those in other sectors of the economy, providing full-time employment and growing crops both for export and for local consumption. A. L. Jolly's pilot projects in the 1950s provided some hope that small holdings can be viable. From further research of this type and a close study of developments on the new land settlement projects, farming systems suited to local needs can be evolved.

If no purposeful changes are introduced into peasant type agriculture like cane farming, then the possibility exists, that, under present conditions, there will be little, if any, improvements in yields per acre or in average production per farmer. Changes are no doubt occurring, but positive action needs to be taken if cane farming is not to become degenerate and lead to the estate sector accounting for more and more of local sugar cane production. Recent change in Trinidad has been directed to the development of new farming settlements rather than to the institution of changes on existing holdings and, in recent years, little seems to have been attempted or achieved among cane farmers. Some type of progressive change is required in this the most important form of peasant production in the island.

Changes are also required in the links between agriculture and other sectors of the economy, mainly the industrial. The setting up of processing plants is already in progress or planned. The purpose of the Central Marketing Agency in forging these links and providing

the means of disposing of farmers crops profitably is already realised and, in the case of one crop, pigeon peas, has shown some progress. There is the possibility that farmers will be able to dispose of crops other than sugar cane in an organised manner. The extension of the present system of guaranteed prices will also assist in the attainment of reasonable farming incomes, which will to a lesser extent depend on the chance of obtaining high prices or reasonable returns only when scarcities of various commodities occur.

Judging from the decision of the Industrial Court relating to mechanisation in the sugar industry, it is realised in Trinidad that agricultural development should be such that any strategy for change should consider both social and economic factors. The estates have been permitted to introduce a system of phased mechanisation which, though the effects on the society will be cushioned to a certain extent, will undoubtedly mean that in future the estates can absorb far less labour than previously. Farmers, on the other hand cannot in the foreseeable future mechanise operations to such an extent as the estates are able to do. The size structure of cane farming precludes this, except if some form of co-operative farming develops. Farmers will have need for at least their present labour requirements. If they are permitted and encouraged to expand, depending on how such expansion takes place, they may even increase their requirements of labour. This may help in further conditioning any serious social dislocation resulting from agricultural changes on the estates, especially considering an increasing population and the present high unemployment rate of over 14% existing in Trinidad. This could be a major case for the expansion of farmers' production and merits close attention.

In the long run, the aim of agricultural development is that adequate returns are received for products sold and that agriculture should contribute to the economy by producing more of the food consumed

locally at reasonable prices, and export goods at prices that are remunerative and competitive on world markets. There is no need for a complete change in emphasis from export agriculture to production for the local market, but there is need for a better balance between the two. The historical emphasis on export agriculture should now be shared with agriculture for local consumption.

This thesis has shown that the obstacles to progress in peasant farming are varied and that many of these flow from the present size structure of cane farms. It is difficult for farmers to practice progressive agriculture under such conditions as have been outlined. To a certain extent, though, development will not depend on the efforts of outside agencies such as through governmental action, but on the initiative and enthusiasm of the farmers themselves. Eventually, if attained, the provision of reasonable incomes will cause a change in attitudes to agriculture in general by both the farming and non-farming population. The history of cane farming appears to be one in which little real encouragement was given to farmers. They were left to use their own initiative and, considering that they were beset by a large number of constraints, it is still possible to argue that farmers have shown considerable enterprise and have contributed immensely to both social and economic progress in Trinidad. Their contribution can be enlarged if obstacles are removed and agriculture becomes a dignified occupation.

* 16. Data supplied by Messrs. Caroni Limited.

* 17. Field work (see Appendix II).

* 18. Map supplied by Map Library, U.W.I., Trinidad.

* 19. Map supplied by Map Library, U.W.I., Trinidad.

* 20. Map taken from J.S. Beard, *The Natural Vegetation of Trinidad*.

Figure 21. Data Sources of Maps and Diagrams used and map taken from

- Figure 1. Compiled from general purpose maps issued by Lands and Surveys Department, Trinidad.
- " 2. Data supplied by S.M.A. Tobago, Annual Statistical Digest, 1967.
- " 3. Data supplied by S.M.A. Tobago, Annual Statistical Digest, 1967.
- " 4. Data from First, Second and third five-year plans. 1967.
- " 5. Data supplied by S.M.A. Wood, in Research Papers No. 3, 1967.
- " 6. Data supplied by Messrs. Caroni Limited.
- " 7. Data supplied by Messrs. Caroni Limited.
- " 8. Data supplied by Messrs. Caroni Limited.
- " 9. Data supplied by T.I.C.F.A., and S.M.A.
- " 10. Data supplied by T.I.C.F.A., and S.M.A.
- " 11. Data supplied by S.M.A.
- " 12. Data supplied by T.I.C.F.A., Messrs. Caroni Limited and Trinidad Sugar Estates Limited.
- " 13. Data supplied by T.I.C.F.A., Messrs. Caroni Limited and Trinidad Sugar Estates Limited.
- " 14. Data supplied by T.I.C.F.A., Messrs. Caroni Limited and Trinidad Sugar Estates Limited.
- " 15. Data supplied by T.I.C.F.A., Messrs. Caroni Limited and Trinidad Sugar Estates Limited.
- " 16. Data supplied by Messrs. Caroni Limited.
- " 17. Field work (see Appendix II).
- " 18. Map supplied by Map Library, U.W.I., Trinidad.
- " 19. Map supplied by Map Library, U.W.I., Trinidad.
- " 20. Map taken from J.S. Beard, The Natural Vegetation of Trinidad.

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- " 22. Map supplied by Map Library, U.W.I., Trinidad.
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- " 25. Map adapted from J. Harewood, in Research Papers No. 3, 1967.
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In Trinidad the draft questionnaire was presented to the following organisations and individuals: The Sugar Manufacturers' Association, The Trinidad Sugar Industry Control Board, the Ministry of Agriculture, The Trinidad Islandwide Cane Farmers' Association, Messrs. Caroni Estates Limited, members of the staff of the Social Sciences Faculty of the University of the West Indies (St. Augustine Campus), and to a number of individual cane farmers. After criticisms and advice were discussed, a new draft of the questionnaire was prepared and this was used in a pilot survey of ten farmers in three different areas. A few changes were made in the wording of certain questions and a section on credit was added. The questionnaire was then printed. Because the survey was done by personal interviews with little help from other interviewers, full questions were not always written on the questionnaire. All those interviewed faced the same questions asked in the same way and ambiguities were clarified as the survey progressed.

The sample of the cane-farming population chosen was obtained by (a) defining the population, (b) obtaining a sampling frame, (c) stratifying the population according to production size and geographical distribution. For each size group at each geographical point, tables of random numbers were then used to obtain the sample of the required size.

Definition of the population: In this survey the 'farmer' is as defined in the Revised Ordinances, 1950, "a person who cultivates or contracts with a cultivator to cultivate canes for sale to a manufacturer

APPENDIX I

The Questionnaire and the Sample of Farmers

The questionnaire was drafted in Edinburgh and discussed with members of the staff of the Geography and Statistics Departments. In Trinidad the draft questionnaire was presented to the following organisations and individuals: The Sugar Manufacturers' Association, The Trinidad Sugar Industry Control Board, the Ministry of Agriculture, The Trinidad Islandwide Cane Farmers' Association, Messrs. Caroni Estates Limited, members of the staff of the Social Sciences Faculty of the University of the West Indies (St. Augustine Campus), and to a number of individual cane farmers. After criticisms and advice were discussed, a new draft of the questionnaire was prepared and this was used in a pilot survey of ten farmers in three different areas. A few changes were made in the wording of certain questions and a section on credit was added. The questionnaire was then printed. Because the survey was done by personal interviews with little help from other interviewers, full questions were not always written on the questionnaire. All those interviewed faced the same questions asked in the same way and ambiguities were clarified as the survey progressed.

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Definition of the population: In this survey the 'farmer' is as defined in the Revised Ordinance, 1950, "a person who cultivates or contracts with a cultivator to cultivate canes for sale to a manufacturer

but does not include a manufacturer who cultivates canes on his own lands.¹
 Thus the population is defined as farmers who grow canes and who have
 a contract² with a manufacturer, but do not have their own milling
 facilities.

The Sampling Frame: The names of all farmers who hold contracts with manufacturers were obtained from both the Cane Farmers' Association and the manufacturers. As the sample was to be drawn according to production size it was thought best to use a five-year average of production for all farmers as the basis for stratification. However, such figures were obtainable from only one manufacturer, Messrs. Caroni Limited. In order to have comparable figures for all three mill operators, it was found that the figures for one year only could be used. The returns for 1967 were the latest available and so figures for that year were used as the basis for stratification according to size groups.

The main criticisms of the frame are as follows: (1) In the case of areas bordering on the hinterlands of Messrs. Trinidad Sugar Estates and Messrs. Caroni Limited in the north, and of the latter and Messrs. Forres Park Limited in the central areas, there were instances where farmers may have contracts with two firms. Most of the farmers failed to admit this, but such an occurrence would generally be brought to light during the course of an interview. (2) On some holdings more than one person may hold a contract. In most cases, however, this was divulged without great hesitation. Moreover, cross-referring of

-
1. Trinidad and Tobago Revised Ordinance, 1950, Ch.23, No.12, Production of Cane Ordinance.
 2. Ibid., "No farmer shall sell canes to a manufacturer and no manufacturer shall purchase canes from a farmer, unless the manufacturer and the farmer have entered into a contract as required by this Ordinance." P.383.

questions on the questionnaire did assist in resolving this problem.

(3) In some cases there were farmers who grew canes, but who did not possess a contract, and so must market their canes through farmers who have contracts. The main effect of the first two situations is that the lists of farmers gave more farmers than there were farms and that these farms where the occurrence of such a situation was not divulged would tend to show lower average yields. The third situation mentioned had the effect of raising average yields. When such circumstances occurred or were suspected during the survey, they were further investigated wherever possible and adjustments made. The first two situations were more prevalent than the third, but in all less than 5 % of the farmers interviewed seemed to be affected.

Stratifying the Population: The stratification according to size groups is that which is published officially by the industry. A histogram using 5-ton classes was drawn for 1967 from a sample of 2,000 farmers. The shape of this histogram did not differ greatly from the shape of the histogram constructed from the official stratification. Moreover, as such figures are available since before 1939, it was thought that for comparative purposes this stratification should be used in the present sample. The stratification is as follows:

Strata	Total population	Sample size	Sampling fraction
0 to 5 tons of sugar cane	625	48	7.7%
6 " 20 " " " "	2,421	121	5.0%
21 " 50 " " " "	3,039	194	6.4%
51 " 100 " " " "	1,943	139	7.2%
101 " 500 " " " "	1,766	203	11.5%
501 " 1,000 " " " "	59	33	55.9%
Over 1,000 " " " " "	17	11	64.7%

The sampling frame, as provided, was drawn up with farmers registered to sell their canes at various purchasing points. With Messrs. Forres Park Limited, a farmer could sell cane at more than one point and was recorded separately as having sold cane at such several points, but ~~with~~ Messrs. Caroni Limited and Messrs. Trinidad Sugar Estates Limited, although permitting the sale of cane at several points, registered all sales from a farmer at one point so that total deliveries from a farmer were easily available. Because of the difficulty caused by the Forres Park system, whose farmers form only a small proportion of the total, it was decided that, both for the sample and the maps, the entire Forres Park purchase of farmers' canes would be regarded as being sold at one point only, the Forres Park mill. Total production figures for farmers who sold cane at several points were obtained by adding the amounts sold at the various points. Because the Trinidad Sugar Estates' purchase was a small one, this too was regarded as being sold at the mill belonging to this firm. However, for Messrs. Caroni Limited, farmers were regarded as having sold their canes at the points where their names were registered, even though canes may be sold also at a nearby purchasing point.

The sample, then, was drawn as follows: The farmers were divided into seven size groups or classes as shown above. For each group a variable sampling fraction was used in order to obtain sample sizes that could be treated statistically (see figures above). For each purchasing point a proportionate number of farmers in each group was chosen by the use of tables of random numbers. The end result was a sample that was stratified both according to size groups and geographical points, the purchasing scales (figure 33). Because the samples at individual points are very small and do not permit statistical analysis, only the size group stratification for all points combined are used in the statistical tables. A geographical spread of the sample

was ensured. The sample is thus regarded as a stratified random sample with varying sampling fractions.

In all 789 questionnaires were completed, but 40 of these were discarded because serious inconsistencies were detected. The inconsistencies in 21 of these consisted of grossly incorrect answers to the important questions on farm size and total production of sugar cane for 1967. In most of these cases the values given were under 50 % of the true values. The inconsistencies were known to be such because accurate figures for production were obtained from sources indicated above. For farm size, the inconsistencies were revealed by cross-questions, for example, answers to the following questions on the questionnaire would give a reasonable indication of accuracy: 3a, 4, 5a, 6a, 6b, 6c, 6d, 7d, 10e, 10f, 10g, 11d and 11e. Eleven of the discarded questionnaires showed illogical replies which could not be verified, such as tonnages sold being much greater than the tonnages for which the farmers were registered. From the writer's assessment of these farmers, it was decided that data contained in these questionnaires were very unreliable. In the remaining eight questionnaires there were refusals to answer questions concerning farm size, acreage under sugar cane and other crops, whether other crops besides sugar cane were sold, number of cattle and other livestock and cost of transport. There was a strong suspicion that the majority of these farmers feared that the survey was being used for the assessment of taxes, in spite of being given written guarantees that this was not so. In some cases there seemed to be the urge to show that they were better farmers than they actually were. Both types of behaviour among rural farming communities are not uncommon.

Questions 7k and 11, concerning sugar cane varieties grown by farmers and irrigation respectively, were discarded entirely after about one-half of the interviews were completed. This was because there was

virtually no irrigation over most of the area, except in Bejucal, and the only questions answered on irrigation were regarding floods. This question depended too greatly on memory of occurrences over too long a period and was, therefore, thought to be unreliable. As far as cane varieties were concerned, most farmers had a mixture of several varieties, but did not know the extent of the acreages under each. Obtaining reliable information on cane varieties would have required prolonged visits to each fragment of a farmer's holding. Some questions were included on the questionnaire in order to obtain background information and these are not treated in the text, but helped in clarifying certain situations. There are also some questions such as 6a, 6b and 6c, which are treated in a condensed form.

Most of this survey work was done between March and July, 1968 and personal visits were made to farmers' homes and holdings. As most of the work was carried out during the harvest period when farmers were selling their canes, interviews were also done at purchasing points. In some cases single visits were sufficient to complete an interview, but as many as five visits were required in others. Except for travelling time, interviews took between 45 minutes and three hours each. If travelling time is added to the time actually spent on an interview, then the time spent on a questionnaire would be far greater. The survey itself provided an opportunity to discuss the industry with farmers and also to appreciate the actual conditions under which farmers live and work.

An uncompleted questionnaire form is included in the pocket.

APPENDIX IIThe Land-use Map of the Sugar Cane Areas

The land-use map, figure 17, was constructed from a combination of interpretation of air photographs and field-checking. The photographs were of 1 : 20,000 (approx.) scale and taken by the Royal Air Force in 1964. The absence of a large-scale land-use map of Trinidad necessitated the construction of this map, in order to obtain a reliable account of the land-use characteristics of the area under study.

The resources available to the writer for the construction of this map were rather limited and this fact, together with the prescribed purpose of the study, dictated the method used in the construction. The photographs were obtained from the Air Photographs Library of the Directorate of Overseas Surveys, Surbiton. They were loaned to the writer in Edinburgh where the first draft of the map was made.

The aim of the classification was determined by the subordinate role of the map in relation to the questionnaire survey. The classification was largely related to the activities of cane farmers, such as the growing of other crops by farmers and the extent of the areas they occupy. It was decided after a reconnaissance study of the air photographs. The writer's previous knowledge of the area greatly assisted in this exercise.

By means of a mirror stereoscope the classes, as shown on the map, were marked with chinagraph pencil on the photographs. With the use of a Grant Projector, the classes so marked were transferred on to a base map at the scale of 1 : 50,000. This base map was made with a great density of roads to help in the alignment of the transferred images on to the base map. This preliminary map was taken to Trinidad and checked

in the field during the period November, 1967 to March, 1968. The field-checking was made very difficult because copies of the air photographs which could be used in the field could not be obtained, though efforts were made to do so. The map at this stage was in three sections, north, central and south. After the field-checking was completed, and on the writer's return to Edinburgh in August, 1968, the three sections were then transferred to another base map with the road pattern removed to permit greater clarity. The areas occupied by the different classes were then shaded.

The method applied was rather crude but, considering the resources available, was the best that could have been used. This method was advised by the mapping staff of the Directorate of Overseas Surveys.

Identification of sugar cane in all its stages of growth was simple. Coconuts, citrus and rice fields also had easily recognisable patterns. The other individual field crops such as vegetables, proved more difficult to identify, as were crops planted in forest clearings. In the forested areas it was difficult to distinguish between true forest and tree crops such as cacao and citrus which did not produce distinctive patterns. Because of the limited time and the purpose of the map, it was decided that in the forested areas, mainly to the south and east of the area surveyed, tree crops and forest should be treated as one class. The swamp areas show as a single class, both those parts that are covered by mangrove vegetation as well as those parts that are not covered.

Pasture and scrub were at first regarded as separate categories. However, because so little of the survey area was under planted grasses or improved pasture, and much of the scrub lands were used as grazing grounds, it was decided to combine these classes for the final map. In some cases where cemeteries do not have tombstones (Hindu and Moslem cemeteries) and are covered over by scrub and grassy vegetation, these

APPENDIX III

proved difficult to distinguish. They are included in built-up areas. No category is shown as light forest. Such areas that have a light forest cover, or a broken forest cover, are included in the classes 'Forest with food crops and other crops' and 'Forest with open clearings.'

Because of the scale at which the map was drawn, certain areas of small extent where sugar cane is grown were omitted. At the scale of 1 : 50,000 only the areas shown could have been represented on this map. The three areas that are not shown and are relatively insignificant producers are the Guanapo, Brother's Road and Rio Claro areas, which together supplied about 3% of the total sugar cane produced by farmers.

During the period of field work it was found necessary to make changes in the delineation of the extent of built-up areas and an extension of sugar cane in some areas. Since the field work was completed, there has been further actual settlement on some lands shown as scrub. These changes are mainly in the Carlsen Field area, where there is a Government Land Settlement scheme in progress. On the first draft as completed in Edinburgh though, no major changes were required.

It must be admitted that no complex instruments were used to make corrections on the map. This means that slight scale distortions are inevitable and exact calculations of acreages are not possible. It must also be noted that no attempt was made to show the quality of management of land.

1960	26,255	1,013	8,717	1,576	1,872	1,074
1961	42,348	2,815	6,496	1,242	1,421	329
1962	33,479	2,113	4,004	1,853	1,075	313
1963	46,578	3,153	8,563	1,135	2,991	82
1964	44,655	3,263	4,878	944	4,698	50
1965	40,834	1,550	4,282	729	2,954	127
1966	35,174	2,557	4,264	959	2,707	172
1967	34,670	3,119	5,498	904	2,749	155

APPENDIX III

Table 1.

Exports of agricultural products (domestic produce), 1958 - 1967.

Year	Sugar	Molasses	Raw cocoa	Citrus	Coffee	Tonca beans
Quantity in ,000 lbs.						
1958	351,741	95,692	18,169	23,578	4,249	258
1959	339,046	102,671	15,885	10,388	5,415	158
1960	420,773	117,197	15,855	25,797	4,052	552
1961	481,672	219,615	12,536	17,772	4,990	184
1962	376,290	139,973	12,894	26,721	3,686	245
1963	430,726	138,950	14,365	19,241	7,883	134
1964	432,735	152,787	10,132	15,695	8,218	75
1965	475,565	139,388	10,729	11,454	7,595	205
1966	381,506	160,071	10,564	14,227	5,320	233
1967	359,063	143,933	10,364	13,171	5,683	138
Value in ,000 \$ TT.						
1958	30,346	1,220	12,745	1,867	2,498	481
1959	30,896	1,149	10,077	744	2,363	310
1960	26,295	1,013	8,717	1,576	1,272	1,074
1961	42,348	2,815	6,496	1,242	1,421	329
1962	33,479	2,113	8,004	1,853	1,075	313
1963	46,578	3,133	8,563	1,336	2,991	81
1964	44,655	3,263	4,878	944	4,658	50
1965	40,834	1,550	4,282	729	2,954	127
1966	35,474	2,557	4,264	959	2,707	172
1967	34,690	3,119	5,498	904	2,768	155

Source: Table 117, Trinidad and Tobago Annual Statistical Digest, 1967, Central Statistical Office, Port-of-Spain.

Table 2.

Trinidad: Sugar production and farmers' share of cane production,
1939 - 1967.

Year	Sugar production (tons)	Canes ground (tons)	Farmers' share	Number of farmers	Exports (tons)
1939	128,455	1,147,335	33.9	12,914	114,344
1940	92,192	795,305	36.4	11,247	77,315
1941	131,609	1,212,628	43.6	13,042	108,313
1942	104,367	984,462	45.7	13,058	84,418
1943	70,920	716,783	46.5	11,542	54,422
1944	74,262	688,833	33.1	9,299	55,339
1945	76,347	725,395	32.4	8,305	59,368
1946	109,603	1,002,967	34.9	9,441	87,067
1947	110,068	1,059,724	30.4	9,997	89,664
1948	115,944	1,156,377	34.9	9,667	95,145
1949	159,135	1,438,245	35.3	9,880	138,712
1950	146,508	1,401,931	36.8	10,342	123,553
1951	140,668	1,432,733	34.0	9,992	117,244
1952	137,358	1,321,444	26.9	10,115	114,510
1953	152,618	1,498,981	30.1	9,784	129,685
1954	172,767	1,659,792	33.0	10,641	149,854
1955	192,793	1,827,723	35.2	10,967	169,386
1956	160,230	1,631,103	34.9	10,769	137,410
1957	167,805	1,554,527	29.1	10,208	142,200
1958	184,035	1,995,108	32.1	10,451	158,191
1959	181,131	1,824,318	35.5	10,924	151,335
1960	217,663	2,207,426	34.4	11,238	188,294
1961	245,681	2,477,651	35.6	12,638	215,214
1962	200,742	2,102,460	33.9	11,100	168,034
1963	227,346	2,372,532	33.6	11,489	192,573
1964	226,531	2,258,577	31.5	10,349	192,770
1965	250,587	2,503,882	34.1	11,097	212,374
1966	210,394	2,284,788	32.9	10,427	170,371
1967	197,918	2,150,583	31.3	9,870	160,346

Sources: (1) Annual Statistical Digest, 1967.
(2) The Soulbury Commission Report.
(3) Unpublished records of SMA.

Sources: Annual Statistical Digests, 1962 & 1967.

Table 3. Statistical table for figure 12.

Table 3.

Average production per farmer by purchasing points, 1967.

Tons cane per ton sugar and price paid per ton of farmers' cane, 1947 - 1967.

Year	Tons cane per ton sugar	Price paid per ton farmers' cane (\$ TT)
1947	9.62	6.52
1948	9.97	7.25
1949	9.05	7.71
1950	9.57	7.77
1951	10.19	7.99
1952	9.62	10.86
1953	9.82	11.36
1954	9.61	11.81
1955	9.48	11.97
1956	10.18	10.98
1957	9.26	14.53
1958	10.64	11.44
1959	10.07	12.30
1960	10.13	11.74
1961	10.09	12.70
1962	10.47	12.40
1963	10.48	17.05
1964	9.97	12.91
1965	9.99	11.42
1966	10.89	10.31
1967	10.87	11.21

Sources: Annual Statistical Digests, 1962 & 1967.

TICFA.

Table 4. Statistical table for figure 12.

Average production per farmer by purchasing points, 1967.

Woodford Lodge) Mamoral Crossing)	365.35	Orange Grove	65.83
Brechin Castle	358.23	St. Helena	64.47
Oropouche No. 6	143.27	Chase Village	60.55
Oropouche No. 3	129.67	Reform	58.80
Cedar Hill No. 2	114.53	Calcutta	57.99
Oropouche No. 4	107.66	Devil Hole	57.94
Barrackpore	102.11	Montrose	54.97
Oropouche No. 7	88.60	Cocoa	52.89
Chickland	84.63	Arena Road	52.50
Oropouche No. 2	81.62	Caparo) Todd's Road)	51.77
Brothers) Gobin Village)	81.30	Forres Park	49.64
Garth) Buen Intento)		Esperance	49.50
Malgretoute	80.69	Woodland	49.42
Hermitage	80.26	Bejucal No. 2	47.86
Inverness	79.80	St. Mary's	47.51
Penal	78.32	Rio Claro	46.31
Mon Jaloux	78.22	Brother's Road	46.15
Williamsville	78.20	Cooper Grange	43.65
Milton	77.41	Dumfries	37.44
Cunupia	76.97	Claxton Bay	34.44
Bejucal No. 3	76.78	Jerningham Junc.	34.19
Oropouche No. 5	76.61	Benard Road	31.22
Windsor Park	76.47	Caroni Savannah	28.56
Caracas	71.32	Tabaquite	19.79
Oropouche No. 1	70.21		
Turab	69.46	Sources: Caroni Ltd. Trinidad Sugar Estates Ltd. TICFA	
Cedar Grove	69.13		
Cedar Hill No. 1	67.45		

Table 5.

Record of timber harvested from national forests by species,
1958 - 1967. (cubic feet).

Year	Mora	Crappo	Olivier	Mahoe	Teak	Cedar	Other
1958	671,600	450,600	230,400	89,700	61,200	40,700	1,023,200
1959	529,900	631,500	255,100	96,600	82,300	69,700	1,116,900
1960	639,900	519,000	222,100	94,400	106,200	76,200	1,129,700
1961	537,600	412,700	173,700	84,200	124,000	50,200	1,030,200
1962	544,163	381,680	169,673	78,511	92,090	43,510	947,573
1963	607,466	342,195	136,615	72,137	85,324	38,084	1,940,279
1964	594,499	390,415	187,918	80,127	137,863	41,821	1,804,057
1965	703,840	353,320	170,120	87,220	134,117	27,900	2,112,483
1966	668,820	221,177	164,902	55,473	102,476	26,600	1,715,352
1967	812,456	260,578	169,304	68,489	126,120	36,660	1,380,938

+ The Trinidad and Tobago Central Marketing Agency has now

Source: Table 119, Annual Statistical Digest, 1967.

have been added to the list of crops for which guaranteed prices are offered.

Source: Table 3, p.5; Beckford, G.L. & Ouscott, M.H. "Intra-Caribbean agricultural trade", in Studies in regional economic integration, Vol.2, No.2, IBER, UWI, Jamaica, 1967.

Table 6.

Trinidad: Guaranteed prices paid by Trinidad Marketing Board, 1965.⁺

Item	Specification	Price (cents TT per lb.)
Pigeon peas	green	10
Pigeon peas	dry	16
Red kidney beans	dry	18
Blackeye peas	dry	13
Corn (maize)	dry	7
Yams	Lisbon	9
Plantains		8 - 10
Cush cush (yampie)		14
Tannias		7

* The Trinidad and Tobago Central Marketing Agency has now replaced the Marketing Board and additional crops might have been added to the list of crops for which guaranteed prices are offered .

Source: Table 3, p.5, Beckford, G.L.& Guscott, M.H. "Intra-Caribbean agricultural trade", in Studies in regional economic integration, Vol.2, No.2, ISER, UWI, Jamaica, 1967.

Table 7.

The composition of livestock units as used in this thesis.

Type of animals	Livestock units
Cattle - Dairy	1.0
- Beef	1.0
- Draught	1.0
Horses	1.0
Mules	1.0
Donkeys	1.0
Pigs	0.1
Goats	0.1
Sheep	0.1

- (a) The young of all animals were counted at one-half the value of the full-grown animal.
- (b) Poultry were not taken into account in computing Livestock units.

K - the total APPENDIX IV (a) by all manufacturers through the
Canadian benefit pool in respect of such period of twelve

- (1) The formula for determining the price of farmers' canes appears in the Third Schedule to Chapter 23 No. 12 and is as follows:

"Rules for determining the price of farmers' canes."

"For the purposes of this schedule -

- A - the average price per ton (determined by the Governor) of grey crystal sugar f.o.b. Port-of-Spain during the period of 1st January to 30th June of the year or such later date in the year as the Governor may fix;
- B - the premium per ton on sugar sold for local consumption, which shall be taken to be the average selling price of sugar (other than granulated sugar) during the period of 1st January to the 30th June of the year or such later date in the year as the Governor may fix (determined by the Governor on the basis of returns made by manufacturers under section 9) less A, multiplied by the local sugar quota for the year, and divided by the total tonnage of sugar manufactured in the Colony during the year as determined by the Governor on the basis of returns as aforesaid;
- C - the value of molasses in the Colony (determined by the Governor) derived from the manufacture of one ton of sugar during the period 1st January to 30th June of the year or such later date in the year as the Governor may fix;
- D - the certificated preference granted by the Imperial Government in respect of sugar manufactured in the Colony, which shall be taken to be the total value of the certificates issued in the year divided by the total tonnage of sugar manufactured in the Colony during the year determined by the Governor as aforesaid;

- E - the total amount received by all manufacturers through the Canadian benefit pool in respect of such period of twelve months as the Governor may fix each year, divided by the total tonnage of sugar manufactured in the Colony during such period;
- F - the expenses of handling canes and of processing and marketing sugar other than granulated sugar, the rate per ton being determined by the Governor on the basis of returns made by manufacturers under Section 9: Provided that in determining the rate per ton as aforesaid the Governor may disregard any costs in particular cases which, in his opinion, are above the average of the costs of the other manufacturers for similar operations;
- G - the total of the funds refunded to manufacturers by the Accountant General under sub-section (5) of Section 9, divided by the total tonnage of farmers' canes purchased by all manufacturers in the Colony during the year as determined by the Governor on the basis of returns made by the manufacturers under Section 9;
- H - the allowance for depreciation and obsolescence which shall be the sum of \$804,966 divided by the total production of sugar, as determined by the Governor, provided that the production exceeds 100,000 tons;
- J - interest shall be taken to be \$4.80 per ton of sugar provided that the total production exceeds 100,000 tons;
- K - number of tons of cane required to produce one ton of sugar as determined by the Governor during the crop year.

2. The price of canes per ton shall be the amount in dollars represented by the following formula:-

$$\frac{(A + B + C + D + E) - (F + H + J)}{K} - G."$$

Field Work (Cane Period)

- I. To buy approximately 3,200 tons of cane per day;
- II. To operate 25 scales per day;
- III. To supervise the buying of cane (canewrights);
- IV. To supervise the loading of canes;
- V. To see that scales and loading equipment are in proper working order, and operating as they should;
- VI. To supervise and take the class of cranes and hoist drivers, loading attendants, canewrights, etc.
- VII. To see that transport is provided for the removal of cane after purchase;
- VIII. To check on cane slings used to operate scales and loading of canes;
- IX. To indent and supervise the issuing of stores, diesel oil etc. where necessary;
- X. To see about the issuing of reaping knives.

Office Work (Cane Period)

- I. To calculate the distribution of tonnage to be purchased;
- II. To work percentages of canes reaped and calculate remissions;
- III. To keep all necessary books, ledgers, pay bills etc., for purchasing approximately 3,200 tons of cane daily;

(b)

"DUTIES AND FUNCTIONS OF THE CANE FARMING DEPARTMENT, CARONI LTD.STE. MADELEINE DIVISION.

FOR the purposes of this memo, the work of the Cane Farming Department is divided into two parts - i.e. Crop Season and Wet Season.

There is a certain amount of over lapping, as some operations are carried out throughout the year:

Field Work (Crop Period)

- I. To buy approximately 3,200 tons of cane per day;
- II. To operate 25 scales per day;
- III. To supervise the buying of cane (caneweighers);
- IV. To supervise the loading of canes;
- V. To see that scales and loading equipment are in proper working order, and operating as they should;
- VI. To supervise and take the time of crane and hoist drivers, loading attendants, caneweighers, etc.
- VII. To see that transport is provided for the removal of cane after purchase;
- VIII. To check on cane slings used to operate scales and loading of canes;
- IX. To indent and supervise the issuing of stores, diesolene etc. where necessary;
- X. To see about the issuing of reaping passes.

Office Work (Crop Period)

- I. To calculate the distribution of tonnage to be purchased;
- II. To work percentages of canes reaped and regulate requisitions;
- III. To keep all necessary books, ledgers, pay lists etc., for purchasing approximately 3,200 tons of cane daily;

- IV. To check cane ledgers, cane summaries, daily cane returns, comparison of weights, canes purchased and canes milled.
- V. To make deductions for Agricultural Credit Society loans, Sulphate of Ammonia, plants and cane slings sold;
- VI. Writing receipts - approximately 600 per week and signing names;
- VII. To balance pay lists and close of same;
- VIII. To fill out 1,700 payment vouchers per week, involving the sum of \$300,000.00 weekly;
- IX. To make out bank requisitions and bank pay lists;
- X. To post A.C.S., ledgers;
- XI. To make out weekly cane returns, showing estimate, tonnage purchased on each scale and the percentage of estimate reaped;
- XII. To make transfers of contracts.

Field Work (Wet Season)

- I. Examining areas and estimating crops;
- II. Settling of disputes (crop and wet season);
- III. Marking of boundaries, etc.
- IV. Supervising plant nurseries and issuing cane plants;
- V. Grading of traces (crop and wet season);
- VI. Building of bridges and placing of culverts;
- VII. Supervising, cleaning and repairing scales and scale houses, derricks and all gear used for reaping farmers' canes.

Office Work (Wet Season)

- I. To keep all records pertaining to cane farming up to date, and records of individual cane farmers; There are approximately 5,000 cane farmers, but 7,000 cards have to be retained, as there are frequent changes in cane contracts;

ANNEX V

- II. To issue cane contracts, transfers of contracts, and fragmentation of contracts, and attending to farmers' identification and record books.

Assuming that each farmer pays at least one visit to the Cane Farming Department during the wet season (a very low estimate - two would be nearer the mark) an average of 10 farmers per day have to be attended to.

- III. To make crop totals, i.e. the amalgamation of canes supplied by each farmer irrespective of the number of scales to which he made deliveries;
- IV. To make pay lists for the balance payment of farmers' canes;
- V. To make lists of farmers' deliveries for the purpose of cess;
- VI. To make statements of farmers divided into tonnage groups;
- VII. To make statements of dates of opening and closing of scales;
- VIII. To make statements of canes purchased and canes milled;
- IX. To make statements - weekly reaping record;
- X. To prepare balance sheets for 22 Agricultural Credit Societies;
- XI. To prepare profit and loss accounts and statements of receipts and payments for audit;
- XII. Writing and signing cheques for loans - approximately 1,500;
- XIII. Balancing A.C.S., ledgers;
- XIV. Making deductions for the Cane Farmers' Association."

Source: TICFA, Submission to Cane Price Commission, 1965, Annex 8.

APPENDIX V

Statistical tables for Chapter V

Table 1.

List of variables used in factor analysis.

- Variable 1. Age of holder.
- " 2. Main occupation of holder.
- " 3. Tenure of holding.
- " 4. Number of individuals in household.
- " 5. Number of agricultural workers in household.
- " 6. Whether or not sugar cane is the main crop on the holding.
- " 7. When did the holder first grow sugar cane.
- " 8. Whether or not intercropping is practiced on the holding.
- " 9. Whether or not another commercial crop is produced on the holding.
- " 10. Number of months per year that holder spends on holding.
- " 11. Number of months per year that holder spends on sugar cane.
- " 12. Number of months per year that holder spends on other crops.
- " 13. Whether or not farmer is full-time farmer.
- " 14. Man-months of paid labour employed.
- " 15. Amount of fertiliser applied per acre, 1967 (cwt).
- " 16. Whether or not advice is received on fertiliser usage.
- " 17. Weeding practices used on holding - whether manual or chemical or a combination.
- " 18. Acreage of sugar cane affected by froghopper damage.
- " 19. Whether or not holder is aware of the froghopper subsidy.
- " 20. Whether or not a plough is owned.
- " 21. Whether or not any other cultivating equipment is owned.
- " 23. Whether or not lorry is owned.
- " 24. Whether or not a tractor is owned.
- " 25. Distance of main sugar cane plot from nearest purchasing scale.

Table 1. Continued.

- Variable 26. Road conditions between holding and purchasing scale - whether good, mediocre or bad.
- " 27. Whether holder employs animal or mechanical transport, or a combination.
- " 28. Whether holder employs hired or owned transport, or a combination.
- " 29. Cost per ton of cutting, loading and transporting cane.
- " 30. Whether or not holder receives agricultural credit.
- " 31. Number of fragments that make up holding.
- " 32. Acreage of sugar cane on holding.
- " 33. Acreage of non-tree crops other than sugar cane on holding.
- " 34. Total acreage of holding.
- " 35. Cane production on holding for 1967.
- " 36. Sugar cane - average yield per acre in 1967.
- " 37. Number of livestock units owned.

The computer programme used for the factor analysis was the Miami Biomedical programme 'Factor'. It was adapted by Mr. Roy Middleton of the Edinburgh Regional Computing centre. The factor analysis was run on the Univac 1108 computer of the National Engineering Laboratory at East Kilbride.

TABLE 2: FAURETS IN ALL CLASSES COMBINED

CORRELATIONS

1	AGE	1.00
2	OCCUPN	05 1.00
3	TENURE	03 07 1.00
4	REWARD	01 09 00 1.00
5	ANNUAL	09 12 00 29 1.00
6	SCHOOL	01 08 05 02 05 1.00
7	PLANTC	02 07 06 11 09 11 1.00
8	INTESEC	05 01 05 07 05 05 16 1.00
9	OTHCOP	02 00 06 02 03 26 00 09 1.00
10	HOFAIR	12 12 05 02 19 05 22 01 10 1.00
11	MCANS	11 10 05 07 18 27 10 16 80 1.00
12	MOCHOP	05 12 02 06 05 21 05 16 47 11 10 1.00
13	PULAIR	14 22 02 10 03 21 05 07 66 68 31 1.00
14	MANHER	03 06 12 05 00 10 45 21 01 29 10 02 36 1.00
15	FRECAT	07 05 06 10 04 11 11 10 12 16 05 13 28 1.00
16	PRELAF	01 03 02 04 07 00 10 01 12 05 01 06 01 13 04 1.00
17	HEWOPR	03 02 06 11 03 07 24 11 00 14 20 05 17 33 19 18 1.00
18	PEPLER	06 05 09 07 01 08 16 03 03 14 18 01 19 27 22 03 21 1.00
19	PROSUB	05 06 05 03 01 05 16 02 10 11 16 04 10 24 21 28 33 1.00
20	OMPLIO	03 04 11 11 07 01 28 12 05 16 20 02 20 12 10 17 22 19 18 1.00
21	OMBTUL	07 04 12 07 03 03 29 02 07 10 03 11 28 03 19 05 18 56 1.00
22	OMBLA	05 05 09 07 04 02 21 13 02 06 08 06 08 08 15 02 05 16 30 1.00
23	OMBEIT	04 14 06 06 12 05 04 01 02 26 27 02 21 02 08 05 09 04 11 05 04 01 1.00
24	OMBLA	02 08 13 07 02 04 38 15 03 16 21 04 21 52 12 19 25 22 16 64 55 17 11 1.00
25	DIETEC	07 11 02 02 01 01 07 07 06 11 10 04 09 22 02 06 06 07 04 11 08 19 11 19 1.00
26	IRADOO	00 08 12 07 03 10 05 11 14 19 07 12 11 05 04 08 02 05 01 07 02 08 16 1.00
27	TRAMM	02 05 11 01 02 02 23 02 11 01 00 00 04 31 03 15 13 03 04 28 18 17 12 31 28 04 1.00
28	TRAND	08 28 07 14 15 07 23 11 00 10 11 04 35 35 17 13 25 23 20 26 18 14 54 78 06 10 19 1.00
29	COMSEC	02 06 02 11 02 05 07 22 03 15 02 11 09 03 10 02 06 02 07 20 05 19 04 30 12 1.00
30	AGALER	02 12 05 15 11 12 14 01 01 26 27 01 19 13 13 15 11 05 10 05 06 08 07 03 11 01 15 02 1.00
31	PLAME	08 10 02 24 16 05 12 13 11 33 04 31 45 16 18 40 27 29 23 11 18 34 12 12 22 36 05 11 1.00
32	SCACHE	06 07 12 06 01 08 10 25 04 19 28 12 23 55 08 19 26 17 20 48 55 08 68 16 08 64 30 08 04 1.00
33	RENTRE	03 02 14 14 08 22 10 03 31 12 05 27 09 15 04 13 13 13 11 18 13 01 14 09 03 13 12 02 04 30 04 1.00
34	TOTOUR	05 08 13 01 01 03 31 22 06 17 21 02 20 47 03 19 21 13 15 43 29 05 68 16 07 23 24 07 06 24 00 19 1.00
35	STONS	04 07 11 09 01 09 45 28 05 21 11 26 63 18 21 30 15 29 50 51 28 15 69 18 10 28 34 06 11 42 80 05 79 1.00
36	ARTIED	03 11 03 04 03 10 03 05 15 18 05 17 22 27 11 07 03 04 07 02 06 06 10 07 11 08 16 03 14 10 04 03 37 1.00
37	LOUNIT	03 07 01 05 06 05 28 02 10 15 12 12 12 15 16 06 13 18 09 17 19 25 10 30 19 05 05 05 17 02 04 29 23 23 35 27 90 1.00

VARIABLES 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

TABLE 3: ALL CLASSES OF FARMERS COMBINED

	VARIMAX ROTATION										
	PERCENT OF VARIANCE										
	1	2	3	4	5	6	7	8	9	10	11
AGE	.100	.139	-.002	-.041	-.013	.134	-.047	-.030	.177	-.699	.007
OCCUPN	-.032	-.635	-.019	-.051	.063	.111	.036	.233	.025	-.085	.042
TENANT	.134	-.037	-.069	-.102	.062	.056	.013	.115	-.003	.144	.717
HOUSLD	.048	-.111	-.043	.038	.087	.769	-.024	.081	-.129	.037	-.096
AGWRK	.017	.163	.006	.053	-.084	.691	-.089	-.161	.082	-.103	.056
SCMNCF	-.005	.164	.684	-.035	.153	.044	.020	-.174	.002	.110	.018
PLNTSC	.421	.166	.055	-.096	.345	.200	-.009	.113	.052	.135	-.087
INTERC	-.223	.070	-.092	.136	-.043	.008	.162	-.508	.232	-.079	.099
OTHCRP	-.003	.017	-.691	-.125	.053	-.010	.031	-.209	.046	.034	.081
MUFARM	.101	.879	-.160	.014	.090	.074	-.128	.015	-.058	-.040	-.072
MUCANE	.173	.797	.248	.016	.193	.130	-.142	.079	-.070	.035	-.110
MUCKOP	-.097	.340	-.753	.022	-.098	-.078	.029	-.116	.041	-.032	.061
FULLYR	.164	.758	-.150	-.011	.138	.035	-.091	.166	-.106	-.109	-.027
MANMTH	.523	.262	.053	-.289	.382	.039	-.006	.191	-.210	.064	.031
FERCWT	.044	.075	.054	.214	.361	.051	.037	.046	-.648	.038	.124
FERADV	.210	-.111	-.100	-.225	.125	.033	-.203	-.623	-.184	-.032	-.074
WEEPR	.167	.026	.018	-.127	.557	.073	-.169	-.036	-.083	.156	-.098
FHPACK	.099	.140	.003	.106	.685	-.024	.100	.073	.039	-.142	.120
FHPSUB	.136	-.001	-.017	.078	.651	-.130	-.156	-.287	-.074	-.052	.054
OWNPLO	.682	.095	-.064	-.000	.187	.149	.125	-.073	.000	.042	.109
OWNCUL	.758	-.025	-.053	.090	.014	.049	-.046	-.201	.102	.115	.037
OWNLTR	.319	.066	.020	-.122	-.032	.123	-.099	.006	.095	.552	.091
OWNGRT	-.048	.195	.055	.235	.027	.053	-.855	-.025	-.020	-.027	.007
OWNIRA	.821	.102	-.020	-.070	.172	.042	.112	-.012	-.055	.021	.051
DISTSC	.109	.187	-.056	-.562	-.056	-.021	.070	.032	.082	.368	-.138
ROADCO	.056	.145	.084	-.148	.026	.121	.022	.095	.012	.101	-.649
TRANHU	.241	-.017	-.059	-.714	.117	.064	.033	-.023	.029	.061	.154
CUSTSC	.003	-.234	-.018	-.146	-.099	.185	-.598	.019	-.106	-.045	.176
AGRICK	.041	.285	.075	.016	.086	.273	.053	-.378	-.099	-.206	-.136
FRAGMT	.268	.183	-.149	-.195	.493	.306	-.244	.063	.047	.007	-.145
SCAGRE	.886	.079	.085	-.125	.086	-.052	-.148	.059	-.099	-.172	-.037
NONTRE	.097	-.020	-.616	-.044	.272	.239	-.052	.025	.039	.106	.075
TUTACK	.874	.057	-.068	-.087	.003	-.081	-.129	.049	-.002	-.017	-.019
SCTONS	.847	.101	.092	-.164	.118	-.005	-.182	.082	-.232	.014	-.042
AVYILD	.066	.155	.053	-.101	-.102	.020	-.061	-.065	-.785	.046	-.048
LSUNIT	.265	.002	-.271	.132	.208	-.027	-.460	-.010	.086	.202	-.228
	13.738	8.613	5.913	4.802	6.158	4.253	4.592	3.332	3.870	3.292	3.444

TABLE 4: FARMERS IN CLASS 1

A6E	VARIMAX ROTATION												
	PERCENT OF VARIANCE												
	1	2	3	4	5	6	7	8	9	10	11	12	13
	9.869	9.220	8.194	7.691	5.181	5.284	4.881	5.684	5.141	4.167	5.052	4.633	3.174
	ROTATED FACTOR LOADINGS												
OCCUPN	-.130	.197	.087	-.041	.058	-.039	-.151	.000	.072	.813	.043	-.041	.035
TENANT	-.193	-.093	.005	.025	.103	-.119	-.517	-.018	.278	-.195	.031	-.539	-.262
HOUSLD	.555	.103	-.067	-.030	-.369	-.622	-.155	.341	.045	-.062	-.049	.009	.020
AGRWK	.490	-.263	-.111	.033	-.020	-.036	-.050	.277	.267	-.153	.069	-.272	.036
SCMNCP	.266	-.219	-.066	.187	-.321	-.013	.189	-.276	-.091	.068	.066	.137	.579
PLNTSC	.766	.137	-.031	.105	-.098	-.238	.028	-.053	.043	-.357	-.590	-.012	.083
INTERC	.040	-.060	-.082	-.030	-.866	-.036	.076	-.017	-.010	-.030	.003	-.026	.010
OTHCRP	-.161	.105	.094	-.091	-.074	-.026	-.013	-.112	-.003	.110	.858	-.116	-.055
MOFARM	.350	.660	-.237	-.122	-.180	.074	.267	.234	.099	.192	.201	.203	.031
MOCANE	.518	.221	-.298	.171	-.211	.163	.208	.436	.073	.184	-.229	.238	-.005
MOCROP	-.067	.775	-.028	-.268	-.027	-.023	.097	.037	.078	.200	.411	.075	.039
FULLYR	.100	.638	-.077	.133	-.026	-.093	-.008	.512	.073	.329	-.126	.075	.001
MANMTH	.599	.211	.192	.048	.154	-.138	.123	-.098	.146	.062	.242	.045	-.229
FERCWT	.058	.068	.031	-.076	-.099	-.183	.777	.191	.163	.326	-.137	.032	.107
FERADV	-.209	.544	-.006	.110	.157	-.558	.126	-.158	-.090	-.296	-.123	-.019	.079
WEEDPR	-.023	-.055	.048	.049	-.167	-.106	-.280	.051	.046	.121	-.062	-.532	.548
FHPACR	.097	-.325	-.164	.089	.443	-.493	.047	.107	-.106	.185	.010	.291	.064
FHPSUB	.046	-.091	-.081	.064	.012	-.741	.101	-.202	.035	.075	.079	.023	-.080
OWNPLO	-.035	.067	-.092	-.908	-.019	.000	.106	.019	.053	-.073	.164	.025	.137
OWNCUL	.029	-.053	.014	.009	-.060	.145	.046	-.086	-.146	.020	.106	-.699	.022
OWNLTR	-.000	.000	-.000	-.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
OWNCRT	.064	.061	-.947	.140	.049	-.083	-.027	-.005	.052	-.043	.059	.048	.056
OWNTRA	-.168	.194	-.013	-.701	-.018	.208	-.027	-.004	-.113	.152	-.260	-.020	-.033
DISTSC	.064	.295	.135	.327	-.347	.296	-.136	.052	.021	.240	.095	.474	.084
ROADCO	-.010	.141	-.030	-.013	.067	.069	.146	.846	.022	-.041	.018	.095	-.111
TRANAM	.207	.469	.411	-.260	-.263	-.095	-.381	-.065	-.044	-.024	-.071	.244	-.146
TRANHO	.049	.062	-.942	-.185	.040	-.080	.012	.002	.069	-.067	.001	.055	.102
COSTSC	-.094	.137	.728	.205	.314	-.039	.003	-.150	-.022	.026	.067	.115	.215
AGRICR	.476	.133	-.030	.143	-.058	-.086	.438	.363	.034	.003	.041	-.079	-.329
FRAGMT	.066	.197	-.061	-.256	-.023	-.010	.045	.165	.786	.193	.203	.053	-.002
SCACRE	.867	.136	-.190	.081	-.014	.021	.043	-.069	-.037	-.014	-.135	-.024	-.044
NONTRF	.009	.019	-.066	-.798	-.034	-.040	-.089	-.095	.283	.018	.364	.084	-.142
TOTAGR	.341	.780	.083	-.154	.166	.105	-.043	.175	.233	-.020	.345	.021	.030
SCOTNS	-.179	-.203	-.386	.347	-.102	.048	.225	-.115	.445	.083	-.113	.029	-.242
AVYILD	-.520	.115	-.033	.329	.181	.262	.347	-.255	.249	-.081	.206	-.020	-.060
LSUNIT	.043	.139	-.215	.023	.041	-.018	.030	.516	.713	-.093	-.108	.064	.129

TABLE 5: FARMERS IN CLASS 2

AGE	VARIMAX ROTATION											
	PERCENT OF VARIANCE											
	1	2	3	4	5	6	7	8	9	10	11	12
12.683	.009	.040	.596	.022	.221	.120	.204	.292	.162	.195	.167	
	.632	.055	.135	.117	.069	.052	.005	.098	.120	.263	.266	
	.220	.134	.028	.126	.135	.018	.017	.100	.079	.016	.715	
	.124	.146	.036	.003	.178	.634	.036	.167	.207	.212	.118	
	.028	.068	.001	.142	.044	.793	.069	.108	.039	.099	.113	
	.023	.336	.065	.247	.013	.068	.281	.583	.126	.161	.010	
	.777	.035	.094	.011	.135	.126	.027	.008	.056	.072	.059	
	.019	.123	.001	.041	.005	.045	.048	.166	.050	.641	.059	
	.106	.037	.039	.025	.018	.037	.214	.785	.052	.008	.048	
	.134	.825	.113	.111	.111	.024	.054	.072	.383	.017	.040	
	.144	.852	.069	.128	.104	.085	.027	.093	.211	.102	.010	
	.107	.302	.150	.050	.043	.045	.019	.094	.835	.082	.089	
	.207	.527	.035	.025	.093	.098	.085	.547	.050	.115	.256	
	.651	.193	.030	.012	.182	.113	.057	.174	.126	.098	.216	
	.094	.017	.079	.144	.028	.147	.035	.270	.137	.652	.164	
	.272	.092	.061	.374	.159	.204	.105	.021	.154	.243	.427	
	.011	.040	.093	.676	.108	.232	.010	.194	.036	.288	.105	
	.138	.174	.025	.097	.143	.317	.482	.536	.065	.148	.023	
	.041	.022	.025	.045	.121	.021	.142	.835	.034	.046	.051	
	.034	.075	.029	.081	.045	.087	.097	.125	.223	.053	.007	
	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	
	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	
	.109	.091	.074	.022	.841	.137	.072	.042	.057	.078	.028	
	.718	.087	.036	.099	.092	.139	.042	.075	.079	.326	.021	
	.016	.142	.005	.093	.095	.739	.109	.009	.050	.139	.043	
	.210	.107	.182	.004	.052	.130	.329	.089	.101	.245	.531	
	.293	.113	.023	.065	.054	.732	.006	.029	.004	.071	.096	
	.342	.132	.012	.012	.821	.109	.084	.046	.152	.011	.108	
	.310	.189	.079	.135	.556	.308	.062	.198	.091	.087	.184	
	.092	.092	.180	.616	.014	.105	.039	.025	.219	.161	.027	
	.407	.055	.354	.382	.097	.115	.115	.295	.093	.106	.017	
	.936	.138	.045	.044	.039	.013	.073	.138	.008	.004	.023	
	.024	.009	.852	.035	.045	.057	.100	.014	.191	.010	.188	
	.831	.023	.305	.030	.087	.050	.084	.115	.196	.059	.003	
	.893	.026	.071	.013	.022	.018	.102	.140	.107	.104	.106	
	.024	.060	.171	.130	.032	.081	.238	.092	.073	.097	.249	
	.020	.033	.679	.057	.053	.040	.069	.038	.030	.147	.005	

ROTATED FACTOR LOADINGS

TABLE 6: FARMERS IN CLASS 3

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
AGE	7.045	7.810	7.127	6.013	3.511	5.164	3.713	5.357	4.058	3.655	3.565	3.488	5.325	4.999
OCCUPN	-.070	-.148	.102	-.018	-.017	.044	-.019	.030	.019	-.018	-.011	.218	.082	-.001
TEANNT	-.201	.648	.070	.096	.015	.151	-.263	-.098	-.046	-.127	.171	.129	-.035	-.169
HOUSLU	-.077	.180	.059	-.022	.426	-.215	-.090	.129	.038	-.049	-.035	.319	-.096	.273
AGRWK	-.107	-.135	.069	.063	.195	.044	-.053	.055	-.790	.137	-.087	.001	-.000	.016
SCMNCP	-.288	.021	.010	.009	.018	.167	.126	.004	-.018	-.135	.171	.140	.047	.093
PLNTSC	-.292	-.163	.103	.322	.183	-.160	.066	-.075	-.153	-.017	-.103	-.044	.075	.013
INTERC	.043	.009	.092	-.099	-.053	-.160	.066	-.074	-.055	-.139	-.055	.136	-.024	-.516
OTHCPR	.029	.153	.237	.124	.016	-.176	-.025	.008	-.070	-.098	.074	.052	-.834	-.069
MOFARM	-.123	-.835	.114	.078	-.101	.061	.010	.194	-.057	.050	.080	-.028	-.077	.134
MOCANE	-.303	-.732	-.189	-.086	-.078	.109	.036	.198	-.040	-.284	-.044	-.000	-.009	-.086
MOCROP	.159	.445	.464	.309	-.070	.017	-.117	-.032	.018	.424	.196	.052	-.266	-.081
FULLYR	-.086	-.741	.099	.154	-.055	.200	-.193	.094	.133	-.019	.060	.041	-.029	-.066
MANMTH	-.287	.020	.234	.032	.117	.144	-.119	-.188	.271	.233	-.064	.057	.128	.168
FERCWT	-.066	-.066	.092	-.122	.466	.485	.181	-.205	-.102	.027	-.277	.198	.186	.043
FERADV	.153	.100	.114	.203	.061	-.138	.721	-.001	.068	-.155	-.047	.122	.014	-.003
WEEDPR	-.071	.137	.110	.151	-.058	.179	.149	-.161	-.157	-.115	-.396	.041	-.260	.357
FHPACR	-.461	.069	.135	-.070	.071	.248	-.031	-.050	.004	.101	.122	.080	.026	.412
FHPSUB	-.051	.101	.214	.109	-.019	.204	.329	.089	.074	-.223	-.224	.402	-.448	.168
OWNPLO	-.233	.045	.042	.374	.075	-.061	-.100	-.014	-.036	-.026	.175	.102	.100	.594
OWNCUL	.011	-.019	-.040	.908	-.037	-.008	.081	-.045	-.023	.012	-.113	-.047	-.036	.132
OWNLTR	-.025	.043	-.044	-.014	.006	-.067	.035	.080	-.032	.823	-.088	.066	-.071	-.009
OWNCRT	-.085	-.228	.029	-.003	-.046	.231	.031	.837	-.004	-.076	-.020	.016	.016	-.144
OWNTRA	-.183	-.002	.116	.245	.103	-.147	.049	.032	-.134	-.069	-.013	-.003	.009	.711
DISTSC	.022	-.143	-.079	.050	.143	-.531	.022	-.083	-.071	-.027	-.176	-.034	-.606	.145
ROADCO	-.003	.025	.074	.063	.110	-.008	.020	-.034	-.089	-.103	-.077	-.833	-.100	.010
TRANAM	.055	.210	.262	.016	.086	-.690	.083	-.084	.135	.125	.113	.090	.031	.114
TRANHO	-.114	-.189	.111	.063	.030	-.065	-.000	.822	-.102	.178	-.036	.045	.007	.123
COSTSC	.149	.128	.005	-.113	.027	-.586	.053	-.462	.116	.014	-.015	-.059	.000	-.164
AGRICR	-.171	-.141	-.062	.010	-.045	.074	.665	.010	-.170	.278	.169	-.178	.041	-.071
FRAGMT	-.241	-.106	.555	.096	-.129	-.135	.094	.033	-.341	.020	-.313	-.114	-.072	.137
SCAGRE	-.826	-.174	.077	.050	-.083	-.080	-.017	.186	-.130	-.046	-.064	.021	.155	.144
NONTRE	-.227	.099	.776	-.018	.012	-.046	.080	.035	-.028	-.020	.029	-.066	-.072	.078
TOTACR	-.491	-.129	.711	.013	-.029	-.039	-.042	.163	-.132	-.053	-.011	.043	.069	.071
SCTONS	-.031	-.095	.062	.126	-.039	-.245	.088	.001	.162	-.092	-.094	.256	.614	.107
AVYLLD	.830	.081	.044	-.019	.101	-.042	-.062	-.180	.131	.064	.026	.065	.178	.012
LSUNIT	-.027	-.071	.050	.879	.009	.033	.104	.155	-.057	.008	-.042	-.028	-.036	.103

TABLE 7: FARMERS IN CLASS 4

VARIMAX ROTATION

	1	2	3	4	5	6	7	8	9	10	11	12	13
5.811	7.986	6.474	6.056	7.913	3.711	4.454	3.827	4.260	3.589	3.747	5.051	4.441	

ROTATED FACTOR LOADINGS

	1	2	3	4	5	6	7	8	9	10	11	12	13
AGE	-.019	-.106	.138	.159	-.037	.043	-.005	-.022	.064	-.725	-.013	.098	.058
OCCUPN	-.058	.521	.137	.015	.127	.038	.420	.133	.143	-.045	.210	.002	.245
TENANT	-.106	.054	-.037	-.010	-.151	-.003	.133	.144	.129	.020	.689	-.033	-.072
HOUSLD	-.095	-.049	-.296	-.088	-.032	.574	.105	.055	-.209	-.109	.049	-.129	.281
AGRWRK	-.205	-.232	-.148	-.117	-.115	.279	-.052	-.297	-.244	-.400	.106	-.248	-.130
SCMNCP	.057	-.118	-.021	.043	-.064	.024	.037	.059	.031	.019	.113	-.036	-.786
PLNTSC	.159	.058	.071	-.269	-.257	.003	-.156	-.222	.117	.012	.633	.028	-.036
INTERC	-.248	.081	.010	-.142	-.082	.115	-.511	.352	.186	.248	-.032	.066	.073
OTHCRP	-.695	.153	.146	-.117	-.092	.089	.040	-.110	-.193	.002	-.120	-.054	.136
MOFARM	-.090	-.878	-.180	-.057	.002	-.063	-.024	.057	.135	-.078	-.011	-.002	-.102
MOCANE	.224	-.869	.106	-.134	.039	.032	.040	-.015	.044	-.076	-.096	.004	-.048
MCKROP	-.713	-.367	-.105	.025	-.018	-.061	-.141	.016	.147	.045	.145	-.118	.050
FULLYR	-.168	-.812	-.020	-.073	.057	.108	.085	.114	.008	-.023	.051	-.042	.112
MANMTH	.037	.006	.248	-.258	-.199	-.193	.361	.022	.232	.129	-.147	.209	.268
FERCWT	.131	.036	-.088	.295	.002	.175	-.014	-.016	-.119	-.009	.247	.705	.058
FERADV	-.463	.244	-.281	.019	-.097	.067	-.098	.105	.181	-.328	-.117	.150	-.233
WEEDPR	-.027	.095	-.088	-.324	.217	-.373	-.046	.157	-.096	.362	.043	.394	.107
FHPACR	.068	-.116	.102	-.280	-.140	.048	.190	.284	-.271	.081	-.090	.520	.213
FHPSUB	-.077	.065	-.050	-.209	-.284	.038	-.060	-.088	-.022	-.106	-.202	.725	-.045
OWNPLO	-.066	-.002	.016	-.048	-.850	.085	-.003	-.069	-.023	.028	-.020	.090	-.013
OWNLTL	-.085	.024	-.031	.022	-.790	-.051	.013	.063	-.073	-.052	.134	.066	.038
OWNLTR	.042	-.056	-.148	.007	.038	.115	.779	.112	.012	.108	.059	.043	.011
OWNCRT	-.035	-.137	-.850	-.060	.178	-.006	-.048	-.038	-.039	.036	-.036	.093	.025
OWNIRA	.012	.045	-.030	-.173	-.814	-.049	-.006	.027	.074	-.015	.181	.013	-.031
DISTSC	-.167	-.041	.196	.019	-.087	-.054	-.012	-.158	.752	.024	.014	-.109	.012
ROADCO	.225	-.124	-.089	-.050	.128	.088	.041	.187	.652	-.096	-.085	-.100	-.067
TRANAM	-.069	.136	.304	-.242	-.229	-.076	.492	-.120	.130	-.039	-.110	-.134	-.173
TRANHO	-.107	-.140	-.782	-.156	-.155	.003	.207	-.089	.051	-.021	-.036	.049	-.076
COSTSC	-.267	.136	.621	-.009	.230	-.087	.163	.077	.251	.128	-.108	.001	-.074
AGRICR	.019	-.060	.086	.005	.064	.774	-.024	-.014	.121	-.049	-.032	.303	-.143
FRAGMT	-.265	-.111	-.114	-.304	-.378	.065	.088	-.089	-.054	-.178	.027	.160	.418
SCACRE	.075	-.143	-.077	-.934	-.062	-.015	.005	.022	.035	.002	.024	-.015	.060
NONTRE	-.501	-.096	-.017	-.128	-.368	-.029	-.054	-.244	.004	-.066	.229	.074	.447
TOTACK	-.279	-.046	-.129	-.728	-.310	.002	-.019	-.075	.018	-.052	.240	-.027	.286
SCIONS	.279	-.069	-.142	-.133	-.087	.210	-.052	.447	.109	-.412	-.183	-.210	.193
AVYILD	.052	.089	.032	.845	.017	-.055	-.046	.133	.029	-.153	-.030	-.082	.050
LSUNIT	-.072	.002	-.219	-.232	-.027	.063	-.032	-.743	.049	-.021	-.094	-.042	.226

TABLE 8: FARMERS IN CLASS 5

		VARI-MAX ROTATION												
		PERCENT OF VARIANCE												
		ROTATED FACTOR LOADINGS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
AGE	5.220	7.669	6.792	8.713	3.932	4.230	4.040	4.540	5.640	5.250	4.174	4.182	4.009	
OCCUPN	.033	-.109	-.220	-.026	-.180	.246	-.044	-.075	-.076	-.081	-.122	.281	-.624	
TENANT	-.102	.697	-.093	-.081	-.028	-.178	.008	.037	-.020	.007	-.054	.158	.179	
HOUSLD	.034	-.016	.067	-.038	-.215	-.113	-.742	.021	.019	.112	.104	-.077	.111	
AGRWRK	.010	-.104	.030	.075	.009	.144	-.694	.001	-.019	-.229	.029	-.038	-.211	
SCMNCP	-.023	-.043	-.584	.148	-.332	-.034	-.200	-.020	.141	.238	-.145	-.104	.145	
PLNTSC	-.170	-.029	-.102	-.553	-.073	.238	-.205	.140	.182	.064	-.029	.070	.028	
INTERC	-.002	-.067	-.150	.142	.003	-.150	-.012	.225	.106	.055	.110	-.152	-.647	
OTHCKP	-.077	-.059	.715	-.057	-.175	-.197	-.022	-.047	.191	.067	.126	.096	.056	
MOFARM	.003	-.895	.147	-.070	-.014	.043	-.074	.042	.010	.044	-.037	.006	-.069	
MOCANE	-.078	-.857	-.275	-.131	-.070	-.033	.012	.040	.046	.028	.038	.018	-.035	
MOCROP	.026	-.108	.769	.105	.079	.052	-.114	.033	.017	.079	-.124	-.029	.040	
FULLYR	-.126	-.769	.033	-.072	.063	-.091	-.041	-.026	.080	.043	.022	.114	.120	
MAINMTH	.199	-.058	-.012	-.655	.200	-.065	.216	.126	.111	.035	-.091	-.048	.032	
FERCWT	-.002	-.164	.051	-.027	.298	-.218	-.118	-.147	-.050	.404	-.329	.368	.081	
FERADV	.072	.165	.341	.021	-.494	-.005	.032	-.274	.148	.163	.150	.076	.197	
WEEDPR	-.163	-.066	.019	-.076	-.115	.101	-.038	-.018	.145	.617	.104	-.236	.143	
FHPACR	.210	-.058	.038	-.121	.199	.129	-.066	-.067	.012	.679	-.235	.119	-.111	
FHPSUB	-.176	.012	.133	-.094	-.102	-.032	.240	.046	-.024	.696	.054	.140	-.074	
OWNPLO	.179	-.152	.065	-.136	.051	.042	.015	-.007	.779	.067	-.020	.079	-.006	
OWNCUL	-.324	-.040	.048	.048	-.165	.086	.051	.023	.673	.012	-.094	-.069	-.097	
OWNLIR	-.103	.019	-.033	-.152	.033	.024	-.050	.002	.018	-.042	-.101	.827	-.054	
OWNCKT	-.632	-.087	-.220	.250	.017	-.106	-.039	-.060	-.254	.071	.025	.058	-.401	
OWNTRA	.373	.053	.072	-.384	.132	-.039	-.169	-.058	.617	.111	.027	.053	.084	
DISTSC	.309	-.084	-.060	-.129	-.057	-.074	-.001	-.239	-.092	.008	.201	.541	.246	
ROADCO	.072	-.138	-.275	.017	-.007	.088	-.146	-.137	-.028	.048	.640	-.173	-.047	
TRANAM	.085	.036	.111	-.158	.056	.101	-.013	-.588	.498	-.093	-.058	-.215	.039	
TRANHO	-.234	-.067	-.199	-.088	.149	-.116	-.143	.625	.161	.263	-.070	-.023	-.334	
COSTSC	.001	.032	.057	-.071	-.116	.080	.111	-.778	-.218	.026	.054	-.012	.268	
AGRLAC	-.020	-.045	-.087	.035	-.616	-.055	-.176	.046	-.054	-.046	-.041	-.016	-.022	
FRAGHT	-.433	.018	.019	-.319	.100	.231	.303	.037	.116	.223	.230	.038	.032	
SCACKE	.013	-.090	-.056	-.832	-.030	.280	-.076	.169	.154	.001	.153	.058	.058	
NONTRE	-.240	.139	.555	-.136	-.045	.034	-.082	-.009	.083	.214	-.277	-.063	-.025	
TOTACR	-.173	-.051	.372	-.772	.034	.186	.024	-.161	.050	.002	-.052	-.082	-.002	
SCIONS	.111	-.055	-.003	-.776	-.065	-.445	.017	-.050	.050	.077	.081	-.138	.065	
AVYILD	.045	.075	.043	.181	-.054	-.884	.012	.069	-.108	-.113	.016	.029	-.010	
LSUNIT	-.739	-.068	.243	-.029	-.016	.047	.094	-.039	-.042	.054	.016	-.032	.130	

TABLE 9: FARMERS IN CLASS 6

VARIMAX ROTATION

	1	2	3	4	5	6	7	8	9	10	11	12	13
AGE	7.778	10.163	7.525	7.849	4.864	4.805	4.815	5.443	7.174	4.632	6.466	7.839	4.705
OCCUPN	.113	-.047	.151	-.039	.024	-.100	-.100	.898	-.038	-.011	-.104	-.041	.038
TENANT	-.066	-.633	.027	-.003	-.227	.222	.134	.304	.095	.060	.151	.061	-.098
HOUSLD	-.062	.205	.079	-.178	.889	-.033	.120	-.016	-.087	-.089	.085	.073	.056
AGRWK	-.186	-.116	-.135	-.307	-.111	.183	.145	-.020	.695	-.029	-.224	.306	.112
SCMNCP	-.109	.028	-.101	-.243	.136	-.232	-.013	.332	.210	-.324	-.474	-.119	.339
PLNTSC	-.093	.031	-.051	.946	-.173	.052	.139	-.037	.086	-.020	-.013	.065	-.050
INTERC	.164	.143	-.120	.176	-.006	-.161	.126	.162	.727	.233	.185	-.134	-.164
OTHGRP	.229	.064	.295	-.157	-.093	.141	-.594	.031	-.105	.011	-.498	-.138	-.204
MOFARM	.168	.119	-.561	-.305	.055	-.020	.058	-.423	.066	.044	-.004	-.400	-.067
MOCANE	-.003	.947	-.026	-.075	.034	.088	-.040	-.035	.074	.140	-.041	-.112	.067
MOCKOP	.124	.355	.037	.035	.041	.099	.002	.005	.054	.120	.012	-.080	.037
FULLYR	.101	.730	-.491	-.455	-.283	-.077	.174	-.000	-.191	.050	-.204	-.198	-.107
MANMTH	-.003	.371	-.191	-.169	.134	-.004	-.184	.049	.178	-.007	.620	-.273	.015
FERCWT	-.131	.071	-.219	.215	-.156	.116	.147	.211	-.104	.061	.181	.750	-.012
FERADV	.016	-.019	-.235	-.166	-.072	.064	-.845	.106	.094	.008	.161	-.122	.171
WEEDPR	.193	.146	-.232	-.036	.049	.212	-.166	.069	-.095	.002	.082	.008	.760
FHPACK	-.169	.108	-.226	.029	-.066	-.027	.356	.244	-.069	.609	-.033	-.143	-.167
FHPSUB	-.034	.153	-.221	.171	.238	.100	.004	-.047	.186	.464	-.541	-.170	-.048
OWNPLO	.846	.015	.000	-.108	-.009	-.068	-.056	.071	.301	.072	.058	.018	-.008
OWNCUL	.774	.057	.026	-.187	-.215	-.068	.031	.056	-.111	-.154	-.122	-.273	.112
OWNLTR	.137	.174	-.444	-.374	-.101	-.208	.053	.217	-.171	-.035	.246	-.165	.248
OWNCRT	-.127	-.061	-.796	.027	.064	.178	-.083	-.094	.241	-.126	.065	.075	.284
OWNTRA	.696	.050	-.063	-.001	-.058	-.020	-.185	-.015	-.292	.284	.284	-.146	-.069
DISTSC	.241	.060	-.278	-.173	.083	-.161	-.350	.454	-.229	-.036	.084	-.130	-.551
ROADCO	.326	-.222	.042	.020	-.663	-.121	.047	-.067	.156	.069	.347	.190	.108
TRANAM	-.310	-.220	-.075	.101	-.107	-.114	-.075	-.369	.410	.135	.047	-.127	.528
TRAMHO	-.169	.148	.054	.068	-.050	.911	-.056	-.008	.037	-.059	-.075	.075	.108
CUSTSC	.134	-.436	.179	.191	.229	.625	-.108	.186	.163	.083	.096	.089	.123
AGRIACK	.208	.173	.110	-.062	-.129	-.046	-.145	-.128	.056	.817	-.067	.032	.154
FRAGMT	.082	.150	-.203	-.048	-.127	.155	-.257	.166	.744	-.123	-.004	.014	.126
SCACRE	.260	.193	-.169	.054	-.052	-.055	-.033	.004	-.106	.035	.360	-.801	.035
NONTRE	.096	.076	-.059	-.942	.040	-.066	-.113	.007	.138	-.032	-.038	-.116	-.077
TOTACK	.372	.093	-.080	-.329	-.041	.130	.144	-.156	-.481	.026	.257	-.491	.076
SCTONS	.402	-.122	-.066	.186	-.060	-.005	-.031	-.263	-.049	-.146	.650	-.142	.077
AVYALU	.066	-.322	.194	.107	.063	-.006	.074	-.241	.069	-.135	.029	.617	.048
LSUNIT	.026	.068	-.807	.067	-.075	-.265	-.123	-.041	.185	.151	.040	-.052	-.029

ROTATED FACTOR LOADINGS

PERCENT OF VARIANCE

1 2 3 4 5 6 7 8 9 10 11 12 13

CANE-FARMING QUESTIONNAIRE

Office Use

County

Ward

Scale Purchasing

Questionnaire No.

1. a. HOLDER'S NAME

Address

.....

b. Age: Under 30

30 - 39

40 - 49

50 and over

(Tick appropriate Box)

2. MAIN OCCUPATION OF HOLDER

a. Agricultural

Non-Agricultural

(Tick appropriate Box)

b. Size of Household

Number of Family Units

Workers (Above Age 16)

Number

Number

Male	Female	Total
------	--------	-------

Agricultural

Non-Agricultural

Dependants

(under age 16 years old and not working)

6. OTHER CROPS

a.

Tree Crops	Acres	If grown specifically for sale then tick
Cacao		
Bananas		
Plantains		
Coffee		
Coconut		
Citrus Total		
[Orange		
[Grapefruit		
[Other Citrus		
Other Tree Crops		
Mixed Tree Crops		
Specify		
.		
.		

TOTAL ALL **TREE** CROPS Acres

b.

FOREST

Producing Timber Acres

Lastro Acres

c.

Non-Tree Crops

	Acres	If grown specifically for sale
Rice [Total]		
[Swamp		
[Hill		
Corn [Maize]		
Pigeon Peas		
Pigeon Peas & Corn		
Pulses (Excluding Pigeon Peas)		
Ground Provision (Total)		
Sweet Potatoes		
Eddoes		
Dasheen		
Yams		
Other or Mixed		
Tobacco		
Vegetables or Mixed		
Other Non-Tree Crops		
Specify		
.		
.		

Total non-tree Crops

Acres

Acres

d. Total Area under cultivation

7. SUGAR-CANE

a. How many tons of sugar-cane did you sell last crop (1967)?

Tons

b. What was your quota for the 1967 crop?

Tons

Don't know

c. How many tons of sugar-cane do you get per acre?

Tons

On Average

Highest

Lowest

d. How many acres do you have at present in

Plant Cane

Acres

Tons per

acre

normally

obtained

from plant

and ratoon canes

1st Ratoon

2nd "

3rd "

4th "

5th and over

e. How old is your oldest Ratoon?

Years

f. How many acres are under the oldest ratoon?

Acres

g. Of your lands under sugar-cane, do you plant any set proportion each year?

Yes

No

If Yes, What Proportion? (in eighths)

h. When did you first grow sugar-cane?

Before 1945

1946-1950

1951-1955

1956-1960

After 1960

(Tick appropriate Box)

LIVESTOCK

[At date of Interview]

SPECIES & TYPE	Number.
Cattle	
for [Dairy (Primarily)	
[Beef ,,	
[Draught (not included above)	
Total	
Water Buffaloes	
Pigs	
Goats	
for [Dairy purposes	
[Meat	
Total	
Sheep	
Horses	
Mules	
Donkeys	
Poultry	
[Chicken	
[Ducks	
[Turkeys	
[Other (for human consumption)	
Total	

10. EMPLOYMENT AND WAGES

a. How many months are you fully employed per year

on your farm?	Months	
in sugar-cane?		
in other crops?		

b. Are you employed on your farm throughout the year?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

c. If NO, What else do you do during the year?

Wage-work on Sugar Estate	
Carting for ,, ,,	
Wage-work for other farmers (on cane or other crops)	
Wage-work in County Council or Public Works.	
Specify Other ,, ,, OTHER	
..... Other Business	
..... Unemployed	
.....	
.....	
.....	

EMPLOYMENT & WAGES (Cont'd)

Did you employ for wages last year any workers (who are not members of your household) on sugar cane?

Yes **No**
 Tick

e. If YES, how many such people did you employ and for how long?

	No. of Workers	No. of Mths. Employed
e.g. 2 workers for 1 month		
1 worker for 11 months etc.		

f. If any workers employed for wages (above) for what purpose were they employed?

	Tick Appro. Box/boxes
In S/cane planting	
„ „ cultivating	
„ „ harvesting	
In work in other crops	
Does not apply	

g. How many people provide unpaid work?

Over 16 years	
Under 16 years	
Total	

11. **IRRIGATION**

a. Do you use any system of Irrigation on your farm?

Yes **No**

b. If yes, what source is used?

Pipe borne	
Wells/Ponds/Springs	
Rivers/Streams	
Other, Specify	

c. If Yes, what system is used?

Sprinkler	
Furrow	
Flood	
Specify.....Hand watering	
.....Other, (Including Combination)	

12 FERTILISERS

a. Do you use any fertilizer (pen manure or chemical) on sugar-cane?

Yes No

b. If YES, when did you first use fertilizer?

	Pen Manure	Chemical
Before 1950	<input type="checkbox"/>	<input type="checkbox"/>
Between 1951 and 1955	<input type="checkbox"/>	<input type="checkbox"/>
„ 1956 „ 1960	<input type="checkbox"/>	<input type="checkbox"/>
1961 up to Present	<input type="checkbox"/>	<input type="checkbox"/>

Tick appropriate Box in each Column if required

c. Did you use any fertilizer on sugar-cane in the past year?

Yes No

d. If YES Type used:

	Tick Box or Boxes	Quantity in Cwt.
Pen Manure	<input type="checkbox"/>	<input type="text"/>
Chemical a. Sulphate of Ammonia	<input type="checkbox"/>	<input type="text"/>
b. Super Phosphate	<input type="checkbox"/>	<input type="text"/>
c. Potash	<input type="checkbox"/>	<input type="text"/>
Total Chemical	<input type="checkbox"/>	<input type="text"/>
Lime	<input type="checkbox"/>	<input type="text"/>

e. How much chemical fertilizer do you use per acre?

cwt

f. If you used chemical fertilizer last year did you buy it on credit or for cash?

Credit	<input type="checkbox"/>	Tick Appropriate Box
Cash	<input type="checkbox"/>	
Does not Apply	<input type="checkbox"/>	

g. If you used chemical fertilizer last year, from whom did you obtain it?

Sugar Factory	<input type="checkbox"/>
T.I.C.F.A.	<input type="checkbox"/>
Commercial Firm	<input type="checkbox"/>
Other, Specify . . .	<input type="checkbox"/>
.....	<input type="checkbox"/>
.....	<input type="checkbox"/>
Does not Apply	<input type="checkbox"/>

12. h. Do you get any advice about the use of fertilizer?

Yes No *D.N.A.

i. If YES, from whom do you obtain said advice?

1. Gov't Agricultural Extension Officer	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Tick appropriate Box or Boxes
2. Sugar-cane Estate		
3. Fertilizer Salesman		
4. Agric. Credit Society		
5. T.I.C.F.A.		
6. Friends or Relatives		
7. Others. Specify.		
.....		

j. Do you obtain other agricultural advice from the above sources?

Yes No *D.N.A.

k. If YES, [about what? Tick Appropriate Box or Boxes From whom?

Pests or Diseases of S/cane	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Insert Numbers as in 12 (i) above
Cultivation Methods (& Planting)			
Transport & Machinery			
Credit			
Subsidies			
Other Crops			
Marketing			
Other, Specify			
.....			
.....			

*D.N.A. DOES NOT APPLY

13. CULTIVATION

a. Is weeding done by Hand Tick

by Chemicals

by Machine

Combination

of above

13. b.

Did you harvest all your cane last year?

Yes No

c.

If NO, why not?

- Because price of cane was too low
- „ of lack of transport
- „ of early closure of factory
- „ of lack of labour at harvest
- „ „ Other, Specify.....
-
-

Tick appropriate Box or Boxes

d.

Did any of your cane suffer from froghopper damage last year?

Yes No

e.

If YES how many acres?

Acres

f.

If your cane suffered from froghopper damage what measures did you take to control it?

- Does not apply
- Spray with Sevin
- „ with other
- Other, Specify.....
-
- None

Tick Appropriate Box or Boxes

g.

Do you know about the froghopper subsidy scheme?

Yes No

h.

If YES, did you apply for the subsidy last year?

Yes
No
Does not apply

14. MACHINERY [At Date of Interview]

Type of Equipment	Numbers	
	Owned	Used but not owned
Soil cultivating: 1. Ploughs 2. Other		
Farm Transport: 1. Lorries & Trucks 2. Carts (Animal drawn) 3. Tractor-Trailer 4. Other		
Farm Power: 1. Tractors (Wheeled) 2. „ (Crawler) 3. Other (Animal)		
Spraying & Dusting: 1. Portable sprayer 2. „ duster 3. Other		
Irrigation: 1. Pumps 2. Other		
Other Agricultural Machinery Specify		
.....		

15. TRANSPORTATION

- a. Approximately what distance is your main cane plot from the purchasing scale? Miles
-
- b. The roads between field and scale, would you say that their condition is?
- | | |
|------------|--|
| Good | |
| Mediocre | |
| Bad | |
| No Comment | |
- c. Is Transport of cane from field to scale done by:
- | | |
|--------------|--|
| Animals | |
| Mechanically | |
| Both | |
- d. Is transportation from field to scale
- | | |
|--------------------|--|
| Hired | |
| Owned | |
| Both Owned & Hired | |

17. d. After you have obtained credit, does the supplier supervise how this money is spent?

- Yes
- No
- Does not apply or No Comment

18. SOCIAL ACTIVITIES

a. What would you consider are your recreational activities?

Tick Appropriate Box or Boxes

- 1. Playing Cards
- 2. ,, Cricket or Football
- 3. ,, Other games
- 4. Meeting other farmers
- 5. Cinema
- 6. Going to the shop for drinks
- 7. Other Specify.....

b. If you answered Yes to (5) Cinema, How often did you go to the cinema in the past month?

No. of Times

19. ATTITUDES

a. Is Sugar-cane the crop you would most like to cultivate?

- Yes
- No
- Dont know or N.C.

b. Would you devote more land to another crop if adequate marketing facilities were provided for such crop?

- Yes
- No
- No Comment

c. Would you like to remain in agriculture even if other jobs were available?

- Yes
- No
- No Comment or Don't Know

20. Questions You Need Not Answer

a. Do you own the home in which you live?

Yes	No	*R.T.C.

b. The House you live in is it:

1. A substantially built house with all conveniences e.g. lights, water sewerage etc.

--
2. Substantially built but with only some convenience

--
3. Insubstantially built e.g. mud house or incomplete.

--

c. Do you have debts or mortgages which were used for either agricultural purposes, weddings, building home etc.

Yes	No	*R.T.C.

d. If you answer YES to (c) above would you say that your debt or mortgage was a very heavy burden.

Yes	No	*R.T.C.

*R.T.C. — Refuse To Comment

