19th ANNUAL REPORT 1971

MAURITIUS SUGAR INDUSTRY

RESEARCH INSTITUTE

ANNUAL REPORT 1971

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CONTENTS

PLATES

Breeding

I. Flowering S 17 growing at high altitude

II. Fuzz, seeds and seedlings of sugar cane

Soils and Plant Nutrition

I. Sugar cane growing on very rocky soil (Latosolic Reddish Prairie) at Mon Trésor-Mon Désert.

II. Effect of potassium deficiency on cane growth, potassium-deficient cane in the foreground and control in the background.

Pests

I. A female scale insect (*Aulacaspis tegalensis*) with her eggs. The insect has been exposed by removing the waxy scale which completely covers the body, as shown overleaf.

Diseases

I. Sugar cane root disease (*Fusarium*)

Weed Agronomy

I. Post-emergence weed control in plant cane

II. Screening of new herbicides with the Chesterford logarithmic spraying machine

Physiology

I. Spraying of sugar cane ripener Mon 045

Irrigation

I. Distribution patterns of new equipment being tested in the field :

(i) Boom - O' - Rain (modified)

(ii) Targetmaster (model 750)

Sugar Manufacture

I. Saturne diffuser at St. Antoine S.E.

II. Cane starch granules stained with iodine (x 500)

Foodcrops

I. Maize ear at early silking

II. Groundnuts grown in the inter-rows of plant cane

STATISTICAL TABLES

FOREWORD

To

The Chairman and Members of the Executive Board

I have the honour to submit the report on the activities of this Institute during 1971.

As agreed by the Board, this report differs from those of previous years both in scope and presentation. The format has been altered and the text is no longer presented in two columns. This should lead to easier reading. By omission of most technical details, which henceforth it is intended to publish elsewhere, an attempt has been made to produce a simplified and balanced account of work carried out during the year, describing progress made, obstacles encountered, and conclusions derived. The length of the report has been reduced and it is presented as a continuous account.

The opportunity has also been taken in this report to give background data that puts the Institute's activities in context. Thus, there is an introduction, followed by a general section, a technical section, and statistical tables. It has been thought fit, now that the Institute no longer deals with sugar cane alone, and the amount of research work on other crops is increasing annually, to have the crop plants that are dealt with as the main headings.

It is intended that detailed accounts of research and experimentation will, in future, appear as definitive, separate publications. The list of publications will thus become a vital part of each Annual Report and it will be divided into sub-headings according to subject matter, with an abstract of each publication where this is appropriate.

It is felt that the separate publication of detailed technicalities will do us much good. If we accept that the well-being of the Institute depends on the esteem in which we are held by the growers on the one hand, and by specialists in the various technical disciplines on the other, then I feel confident that we are catering in an improved manner for both groups by presenting the report along the lines considered. To sum up, it is hoped that this and future Annual Reports will provide firstly, a general account of the Institute's activities that is not difficult to assimilate, and secondly, a guide to further information on research activities recounted elsewhere in separate publications by members of the technical staff.

Director

MEMBERS EXECUTIVE BOARD

Mr. J. Maurice Paturau, C.B.E., *Chairman, representing the Chamber of Agriculture*

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Mr. F. North-Coombes
} *representing the Société de Technologie Agricole et Sucrière*

and the senior staff of the Research Institute

STAFF LIST (as at 31st December 1971)

Director	R. Antoine, B.Sc. (Lond.), A.R.C.S., Dip. Ag. Sci. (Cantab.), Dip. Agr. (Maur.)
Asst. Director	J. D. de R. de Saint Antoine, B.S. (L.S.U.), Dip. Agr. (Maur.)
Librarian	Miss M. Ly-Tio-Fane, B.A. (Lond.)
Draughtsman-Photographer ...	L. S. de Réland, Grad. N.Y.I.P.
Asst. Draughtsman-Photographer ...	J. Forget
Liaison Officer	L. P. Noël, Dip. Agr. (Maur.)
Chief Sugar Technologist ...	J. D. de R. de Saint Antoine, B.S. (L.S.U.), Dip. Agr. (Maur.)
Chemist	E. C. Vignes, M.Sc. (Lond.), F.R.I.C., Dip. Agr. (Maur.)
Associate Sugar Technologist ...	J. T. d'Espaignet, B.Sc. (Glasgow), A.R.C.S.T., Dip. Agr. (Maur.)
Senior Asst. Sug. Technologist ...	M. Randabel, Dip. Agr. (Maur.)
Assistant Sugar Technologist ...	J. F. R. Rivalland, B.E. (Chem.), Queensland
Laboratory Assistants	L. Le Guen
	M. Abel
	R. Wan Sai Chong, Dip. Agr. (Maur.)
Temporary Sugar Technologist ...	A. Bérenger, Dip. Agr. (Maur.)
Chief Agriculturist	G. Rouillard, Dip. Agr. (Maur.)
Associate Agriculturists ...	M. Hardy, Dip. Agr. (Maur.), *i/c Réduit Expt. Stn & Irrigation*
	R. Ng Ying Sheung, Dip. Agr. (Maur.), *i/c Union Park Expt. Stn*
Senior Field Officer	F. Mayer, Dip. Agr. (Maur.) resigned 31.12.71
Field Officers	L. Thatcher, Dip. Agr. (Maur.), *i/c Belle Rive Expt. Stn*
	J. C. Carmagnole, Dip. Agr. (Maur.), *i/c Pamplemousses Expt. Stn*
Technical Officer	G. Mazery, Dip. Agr. (Maur.)
Consultant Agronomist	P. Halais, Dip. Agr. (Maur.)
Technical Officer, Food Crops ...	R. Mamet, Dip. Agr. (Maur.), F.R.E.S.
Assistant Agronomists	A. J. Vaudin, N.D. Agri. E.
	A. R. Pillay, B.Sc. (Q.U.B.), Dip. Ag. Micro. (Sydney), M.Sc. Agr. (Sydney)
Temporary Assistant Agronomist	Z. Peerun, B.Sc. (Bangor)
Scientific Assistants	A. P. F. Chan Wan Fong, Dip. Agr. (Maur.) as from 1.3.71
	H. Toohim, as from 1.3.71.

Chief Chemist	...	Y. Wong You Cheong, Ph.D. (Q.U.B.), F.R.I.C.
Senior Assistant Chemists	...	L. Ross, Grad. R.I.C., Dip. Agr. (Maur.)
		P. Y. Chan, M.Sc. (Lond.), A.R.I.C.
Assistant Chemists ...	...	P. Nababsing, B.Sc. (Exeter), Ph.D. (City, Lond.), A.R.I.C.
		P. J. Deville, B.Sc. (Wales), Dip. Agr. (Maur.)
		L. C. Figon
Laboratory Assistants ...	...	C. Cavalot
		H. Maurice
		Mrs. J. Gauthier
		D. Ah-Koon
		I. Jhoty
		L. d'Espagnac, as from 1.2.71
Chief Entomologist ...	...	J. R. Williams, ph.D. M.Sc. (Bristol), D.I.C., F.I. Biol.
Assistant Entomologists	...	M. A. Rajabalee
		H. Dove, Dip. Agr. (Maur.)
Chief Plant Pathologist ...	...	C. Ricaud, Ph.D. (Lond.), D.I.C.
Assistant Plant Pathologist	...	J. S. Félix, Dip. Agr. (Maur.)
Experimental Officer ...	...	J. R. Moutia, Dip. Agr. (Maur.) as from 1.3.71
Laboratory Assistants ...	...	S. Sullivan
		P. Ferré
Plant Breeder and Biometrician ...		J. A. Lalouette, Dip. Agr. (Maur.)
Associate Plant Breeder...	...	P. R. Hermelin, Dip. Agr. (Maur.)
Assistant Biometrician ...	...	L. C. Y. Lim Shin Chong, B.Sc. (Leicester),
Field Assistants ...	...	S. de Villecourt, resigned 31.8.71
		S. Duchenne
Temporary Statistician ...	...	M. Herchenroder, B.Sc. (London), F.I.S., A. Inst. of Ph. & Phy. Soc.
Botanist	...	H. R. Julien, Ph.D. (Reading)
Weed Agronomist ...	...	G. Mc Intyre, Dip. Agr. (Maur.)
Laboratory Assistants ...	...	J. Pichen
		J. C. Autrey
Secretary Accountant ...	...	P. G. du Mée
Asst. Secretary Accountant	...	J. Desjardins
Clerks	...	Mrs. M. T. Rae
		Mrs. A. Williams
		Miss P. Julien
		Miss M. N. Durup
		Mrs. M. Montocchio

THE MAURITIUS HERBARIUM

Curator	...	H. R. Julien, Ph.D. (Reading)
Herbarium Assistant ...	...	J. Guého

Introduction

INTRODUCTION

Development of Agricultural Research

Although agriculture has been one of the mainstays of our economy since the beginnings of colonization, organized research in agriculture is of comparatively recent date. In the enlightened spirit of the eighteenth century, investigations were carried out by interested parties that included trained scientists like Joseph François Charpentier de Cossigny, and others who could be described as empirics touched with genius, like Jean Nicolas Céré and his close Bourbon associate Joseph Hubert. The first agricultural records of the *Jardin du Roi*, now Royal Botanic Gardens, Pamplemousses, dealt mainly with the acclimatization and dissemination of economic plants; its success in promoting agriculture among the colonists led Sir Joseph Banks, who wished to stimulate agricultural production in the British West Indies towards the end of the 18th century, to cite the efforts made at the *Jardin du Roi* as an example that should be followed.

Still, it was not until November 1853 that a *Société d'Agriculture de Maurice* was formed, and in the following month it elected a committee of thirty members to represent it under the name of the *Chambre d'Agriculture de Maurice*, an idea mooted by Hubert and Cossigny in the late eighteenth century. To be in a position to carry out the objectives of the Society as regards the progress of agriculture and the sugar industry *la connaissance de toutes les améliorations de culture et le moyen de perfectionnement appliqués à la fabrication*, the President of the Chamber, Sir Virgil Naz, presented a formal motion on the 12th April 1877 for the creation of an Agronomy section to act as a *centre de communication, d'échanges d'idées et de connaissances entre planteurs... et les communique(r) au corps agricole et au public par l'entremise de la Chambre.*

The seed took time to germinate and develop. Not until 1885, when Mr. William Newton had mobilised opinion and attracted the attention of the Colonial Office with his pamphlet *La Crise Sucrière*, was the necessity of a research centre, supported by agricultural teaching at the Royal College, seriously considered. The structure and objectives of a *Station Agronomique*, and whether an agronomist or a chemist should be chosen as its Director, were subjects debated for another five years. A most interesting summing-up entitled *La Station Agronomique: son but; sa direction; ses travaux* signed by G.L. Clarenc and L. Fouquereaux de Froberville, 1892, recommended the appointment of an agronomist as Director, the implementation of agricultural studies in the college curriculum, and discussed the opportunity of developing secondary crops.

The *Station Agronomique* was officially inaugurated on the 30th June 1893, and was fortunate in having as its first and only Director a man of the stature of Philippe Bonâme. The results of his work are embodied in 18 *Annual Reports* and various *Bulletins* and papers, aptly summarized in Louis Baissac's short publication : *L'Œuvre de Ph. Bonâme à l'Ile Maurice — Tables Bibliographique et Analytique* (1921). Three years after assuming office, Bonâme submitted to the Chamber his classic short report on *Les Cultures Secondaires*. In this publication are included crop plants which are back on the agenda of research to-day.

By the first decade of the twentieth century, it was felt that a new central organization was needed to keep the efforts of the agricultural community in pace with the time. Following proposals

made by the Chamber of Agriculture, the Colonial Office created the Department of Agriculture under the direction of F.A. Stockdale, an agronomist and formerly Assistant Director of the Department of Science and Agriculture, British Guiana. Bonâme was appointed Assistant Director, *La Station Agronomique* and the Bureau of Agricultural Statistics of the Chamber being absorbed in the new organization. This lasted until 1930, when in order to cater for research and experimentation directed particularly towards improving efficiency in the sugar cane industry, the Sugar Research Station was created. This operated until 1952, and the results of its work are to be found in 23 *Annual Reports* and 19 *Bulletins*, which include important contributions to the knowledge of the sugar cane plant.

Lack of staff and the changed conditions in the competitive sugar market after World War II prompted the Governor, Sir Hilary Blood, to revive in January 1950, the recommendation first made in 1947 by the Mauritius Economic Commission, and discussed on several occasions without any headway being made, that the industry itself should take over the Station. Thus a trend of events was set in motion which culminated in the creation of the Mauritius Sugar Industry Research Institute, heir to the tradition of agricultural research which has been discussed.

Set up by Ordinance No. 9 of 1953, the objects of the Institute were originally "*to promote by means of research and investigation the technical progress and efficiency of the sugar industry*". This is the task which its first Director, P.O. Wiehe, set himself during the fifteen years he was in office. Perhaps his success has been most aptly summarized, at the time of his retirement, by the Chairman of the Executive Board, in the following words : '*from a Sugar Cane Research Station almost at a skeletal stage, he created an institution which was soon to occupy a prominent place in the world of sugar research*'.

The departure of P.O. Wiehe in 1968 to occupy the post of Vice-Chancellor at the University of Mauritius coincided with the transition of the island from a colony to independent status and the Institute became more and more involved in the country's battle for self-sufficiency. Attention was focussed on the production of secondary crops in cane interlines. Begun with a grant from the Chamber of Agriculture in 1968, a programme of research on this subject was devised, expanded with financial assistance from the Government and the private sector, until 1970 when the Foodcrops Division became an integral part of the Institute.

Organization

The M.S.I.R.I. is governed by an *Executive Board* whose members include one government official, one representative of the Chamber of Agriculture, three representatives of owners of sugar cane estates with factories, one representative of large planters, two representatives of small planters.

Its programme of research is elaborated through a *Research Advisory Committee* which maintains close co-operation with the Agricultural Services of the Ministry of Agriculture, the Mauritius Chamber of Agriculture and the University of Mauritius.

The M.S.I.R.I. operates besides the Head Office, which comprises divisions of cane breeding and genetics, pathology, entomology, plant physiology, agronomy, soil and cane nutrition, sugar technology, foodcrop production in cane land, 4 experimental stations in the main climatic zones of the island.

The Library

The development of the Library has been conditioned by the very factors which worked towards an expansion of the original objectives of the Institute. When the Library was started in 1953, the core of the collections consisted of technical literature on sugar cane agronomy and sugar manufac-

ture. It was gradually enriched with a collection of prints and original drawings of sugar cane varieties and of early publications on the history of the sugar cane. To-day, its collections number 12,704 volumes; periodicals and reports received total 506 titles.

Distance from other research centres prompted the decision to concentrate on the build-up of runs of relevant periodical literature, and success in this aspect of library expansion has been achieved through the co-operation of numerous libraries in the world which have generously donated duplicate material. To-day complete sets of many rare agricultural periodicals are available for consultation.

From the very beginnings, the programme of co-operation has been elaborated on a liberal policy of exchange, the main elements of which have been our publications : *Annual Reports*, *Occasional Papers*, *Technical Circulars*, *Weed Flora* and occasional monographs. But the unique contribution has been to provide research workers in Mauritius and abroad with documentation culled from collections of scientific papers and agricultural archives connected with the development of Mauritius and the islands of the South Indian Ocean.

In 1960 the Mauritius Herbarium was transferred to the seat of the M.S.I.R.I. and, coming with the Herbaria, was a collection of rare botanical literature on the flora of the Mascarenes.

Concurrently, more specific projects have been elaborated with Institutes collaborating on the exchange programme. Thus a joint catalogue of sugar periodicals in the Berlin Sugar Institute and in the M.S.I.R.I. is in preparation. The lacunae which have been revealed in course of the work have led to an enquiry into ways and means of obtaining and preserving for developing countries the sugar literature of the world. It is a hopeful prospect for librarians of the sugar world to hear that the subject of a deposit library interested the technologists assembled at the 14th Congress of the I.S.S.C.T., held in Louisiana in November 1971, and that a resolution was carried on this important aspect of technical documentation.

As reported earlier, the Institute since 1968 has assumed responsibility for experimenting in other foodcrops besides sugar. This has opened the door to investigations in a variety of food plants and set the Library on a path which had not been originally planned : that of functioning in the present Mauritius context as a national agricultural library.

The Mauritius Herbarium

The origin of the Herbarium goes to the early XIXth century when a young naturalist, Wenceslas Bojer, was sent out from Europe to explore East Africa, Madagascar, and neighbouring islands. Eventually he was persuaded to stay on in Mauritius and obtained a post at the Royal College in Port Louis. He formed a close friendship and life-long collaboration with a resident naturalist, Louis Sulpice Bouton, and together they made extensive botanical explorations in Mauritius.

The collections of plants made by Bojer and Bouton supplemented by those of P.H. Ayres (medical officer in Mauritius from 1856 to his death in 1863) together with a manuscript flora prepared by the latter, formed the basis of J.G. Baker's *Flora of Mauritius and the Seychelles*, published in 1877.

In 1868, the Royal College Herbarium was transferred to the Royal Botanic Gardens, Pamplemousses, then under the control of the Director of Forests and Gardens. For various reasons, partly due to lack of interest and proper supervision, a period of decline set in, which continued for the next fifty years.

In 1928, a Museum Reorganisation Committee was appointed to consider the future policy and direction of the Port Louis Museum, an integral part of the Mauritius Institute (Public Library and Museum) : two very important recommendations were made and accepted by the Board of Directors of the Institute. These were, firstly, that the Natural History Museum should become regional in character rather than global, and secondly, that a botanical section should be started. In consequence,

the Mascarene specimens at the Royal Botanic Gardens were restored as far as possible and formed the basis of the new botanical section of the Museum.

In 1958, it was proposed that the herbaria of the Department of Agriculture and of the Sugar Cane Research Station should be combined with that of the Mauritius Institute and Public Museum, Port Louis, and housed in air-conditioned quarters at the newly founded Sugar Industry Research Institute. Two years later, the work of transferring and combining the three herbaria was completed, and the Mauritius Herbarium came into being. Finally, at the end of 1969 it was decided that the Herbarium should become integrated with the Botany Division of this Institute, the Botanist in charge assuming the post of Curator.

In addition to the botanical collections in the Herbarium, now amounting to upwards of 17,000 specimens, a valuable reference library on Mascarene botany has been acquired. The resources of the Herbarium and its Library are indispensable for the publication of the projected *Flora of the Mascarene Islands*, the planning for which is now in an advanced stage.*

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* This section on the Herbarium is extracted from the original paper published in *Rep. Maurit. Sug. Ind. Res. Inst.* **17** (1969) : 157-163.

General Report

GENERAL REPORT

Board Membership

The only change on the board for the year under review was the replacement of Mr. S. Bunjun by Mr. H. Lallmohamed.

The Board held nine meetings during the year.

Establishment

There were three resignations during the year : Messrs. Francis Mayer, S. de Villecourt and Mrs. D. Cantin. The last one was replaced by Mr. R. Wan Sai Cheong. The other appointments were Mr. J. R. Moutia as Experimental Officer in the Plant Pathology Division, and, at a more junior level, Messrs. A.P.F. Chan Wan Fong and H. Toohim in the Food Crops Division and Messrs. I. Jhoty, D. Ah-Koon and L. d'Espagnac in the Division of Soil and Plant Nutrition. Mr. A.R. Pillay, a graduate of the University of Sydney and an Assistant Agronomist in the Food Crops Division, left on a one-year study leave, to read for a Ph.D. at the same University from which he had obtained a scholarship. He is being replaced, on a temporary basis, by Mr. Z. Peerun. Also, Mr. G. Mc Intyre, Weed Agronomist, has been granted extended leave to read for a B.Sc. Honours degree at Portsmouth Technical College.

Mr. J.R. Williams has been awarded a Ph.D. by the University of Bristol, where he graduated.

Finance

In view of the alarming financial situation of the M.S.I.R.I. — a state of things which has been a major concern of the former Director, the present Director and the Executive Board for several years — and upon the advice of the auditors, a report on future financing of the Research Institute was submitted to Government.

It is an accepted fact that the present system of financing is far from satisfactory in that :

(a) the income derived from the cess represents only 0.7% of the value of the crop, whereas the accepted minimum is 1% ;

(b) the cess, being levied on sugar production, yields an income which fluctuates with the size of the crop, particularly so in an island where the vagaries of climate can affect to a large extent the amount of sugar manufactured.

In the report, therefore, an attempt has been made to stabilize annual income in recommending that the cess be applied on "insurable sugar" ; to try to meet the requirements of the M.S.I.R.I. for a few years to come through an increase in the present cess and finally to write off the present large overdraft.

It has therefore been recommended :

(a) that Government makes a capital grant, or long-term loan free of interest, bearing in mind that the Research Institute was set up without any initial capital grant; and

(b) that the increase in the cess be borne largely by millers, to a lesser extent by large planters, and not at all by small planters.

There are hopeful indications that the recommendations will be favourably considered by Government, the more so that millers and large planters have readily accepted the proposals.

Building Programme

The building programme initiated two years ago in order to house the Food Crops Division and provide the additional laboratory and office space badly needed by a number of other divisions is now nearing completion.

The following buildings and alterations have already been completed :

(i) A wing to the Biology Unit, which houses the Food Crops Division on the ground floor and the Entomology Division on the first floor.
(ii) Conversion of the former Entomology Division into additional laboratory and office space for the Pathology Division.
(iii) Extension of the Herbarium, part of which is now occupied by the Botany Division.
(iv) Transformation of the Exhibition Building into offices and a data-processing room for the Biometry and Plant Breeding Division.
(v) Construction of dark rooms for research on the flowering of sugar cane.
(vi) Construction of stores for the Sugar Technology, Chemistry, Pathology and Food Crops Divisions.
(vii) Construction of garages for three vehicles.

An extension to the Administrative Building, which will provide an office for the Assistant Director and additional space for the Secretariat will soon be completed.

It has unfortunately not yet been possible, through lack of funds, to extend the Food Crops building, as contemplated, in order to :

(i) move the Soil Physics Section to the ground floor of this extension ;
(ii) transfer the Section of Draughtsmanship & Photography, which has always been very cramped for space, to the first floor;
(iii) liberate the area now occupied by the above Section, badly needed for enlarging the Library.

It is hoped that next year it will be possible to implement this part of the building programme.

Director's Missions

The Director, accompanied by Mr. J. Vaudin, Assistant Agronomist, visited Madagascar from the 13th to 17th July in order to study the "Bobby" groundnut decorticator at Morondava, on the West Coast.

From 29th August to 4th September he attended, as Regional Representative for Mauritius, a conference held in Addis-Abeba on "Agricultural Research and Production in Africa", given by the Association for the Advancement of Agricultural Sciences in Africa (A.A.A.S.A.). He then visited the *Station pour l'Amélioration des Plantes* at Clermont-Ferrand, France, to study maize breeding. Discussions also took place at the Tropical Products Institute, London and Culham, and the firm Gunson (Sortex) Ltd., London, on problems related to groundnut production. Finally, visits were paid to the Overseas Development Administration, London, the Kew Herbarium, Richmond, the *Office de la Recherche Scientifique et Technique Outre-Mer*, (O.R.S.T.O.M.), and the *Muséum d'Histoire Naturelle, Département de Phanérogamie*, both in Paris, in connection with the preparation of the Mascarene Flora.

In order to obtain first-hand information on crops such as maize, groundnuts, potatoes and soya beans, which could be cultivated in the sugar cane lands of Mauritius, visits were kindly organized, between the 10th and the 23rd of October, to various research centres in the United States by the African-American Institute. The following research centres, in Government Departments and

Universities, were visited : the Plant Quarantine Division, United States Department of Agriculture (U.S.D.A.), Hyattsville, Maryland ; the Plant Industries Station, U.S.D.A., Beltsville, Maryland ; the Crop Science Department, North Carolina State University, Raleigh, North Carolina; the Emory University, Atlanta, Georgia; the College of Agriculture, University of Georgia, Athens, Georgia; and the Federal Research Station, Tifton, Georgia. In addition, visits were paid to Lilliston Corporation, Albany, Georgia, and Pearman and Williams, Inc., Tifton, Georgia, in connection with groundnut harvesting equipment, and Russell Daniel Irrigation to see the "Circle Master" irrigation equipment.

Finally, the Director, as regional Vice-Chairman for Mauritius, led a delegation to the XIVth Congress of the International Society of Sugar Cane Technologists held in Louisiana from October 25th to November 4th, the M.S.I.R.I. being represented by Messrs. J.D. de R. de St. Antoine, Assistant Director, J.A. Lalouette, Plant Breeder and Biometrician, and Dr. Y. Wong You Cheong, Chief Chemist. The Congress was followed by a Post-Congress Tour of the Florida Sugar Industry from 6th to 9th November.

Staff Movements

Seven officers of the Institute, Dr. Y. Wong You Cheong, Messrs. Cavalot, Hardy, Lalouette, du Mée, Maurice and Le Guen, went on overseas leave during the year and, as usual, devoted part of their time visiting scientific research institutions. Thus, Dr. Wong and Mr. Maurice went to Europe, the former calling at research centres in England, France, Holland and Switzerland, and the latter in England and France; Messrs. Lalouette and Hardy to the Republic of South Africa and Europe; Mr. du Mée to Europe and Messrs. Cavalot and Le Guen to Australia.

Dr. C. Ricaud visited the University of Madagascar, in connection with virological studies conducted in co-operation with the *Ecole Nationale Supérieure d'Agronomie.*

Dr. J.R. Williams went to Réunion Island in order to collect predators of the scale insect of the sugar cane.

Dr. P. Nababsing was granted special overseas leave of one month, and while in U.K. visited various experiment stations.

Mr. J.T. d'Espaignet spent 12 days in South Africa mainly to study the diffusion process of sugar extraction.

Mr. I. Jhoty was sent on a mission to Rodriguez in connection with the land capability mapping of the island.

Mr. J. Guého went on a plant collecting expedition in Réunion Island.

Finally, Dr. Wong and Mr. Lalouette visited sugar research stations in Australia and Hawaii on their way to attend the international Congress of the I.S.S.C.T.

Comité de Collaboration Agricole

The XXth Annual Conference of the *Comité de Collaboration Agricole, Maurice-Réunion-Madagascar* was held in Mauritius from 20th to 27th November, the Institute being represented by the Director, Chairman of the Committee, Mr. P. de C. du Mée, Secretary-Treasurer of the Mauritius Section and Mr. J.D. de R. de St. Antoine, President of the *Société de Technologie Agricole et Sucrière de l'Ile Maurice.*

Personalia

The distinguished visitors who were welcomed at the M.S.I.R.I. during 1971 are : H.R.H. Prince M.J. Dlamini, Prime Minister of Swaziland and his suite; the Honourable M. Foogooa, Minister of State, Ministry of Agriculture and National Resources, Mauritius; H.E. Mr. Langenbacher, Swiss Ambassador; Messrs. Edward Milne, David James, and Neil Marten, House of Commons, London, and later a British Parliamentary Delegation made up of Messrs. Bernard R. Braine, Ernest G. Perry and Michael H. Lawrence; M. Le Professeur Louis Leprince-Ringuet, *membre de l'Académie des Sciences, membre de l'Académie Française;* Mr. C.H. Curtis, Agent General for Queensland, London; M. Raymond Panié, *Inspecteur Général des Finances*, France; Mr. Peter J.D. Dart, British Council Representative in Mauritius; Mr. René Leclézio, Joint Managing Director, Swaziland Sugar Milling Co. Ltd.; Mr. J.P. Willsher, Deputy Chairman and Manager, Illovo Sugar Estates Ltd.; Mr. Charles Lynn of the Overseas Development Administration, London; Mr. Raymond Norris, Secretary of the West Indies Sugar Association; Mr. E.M.J. Parry of the International Sugar Organization; Mr. Emile Costa of the *Bureau International du Travail*, Geneva; Mr. Robert Glen, Secretary, Commonwealth Scientific Committee, Africa House, London; M. Paul Fels, O.R.T.F., Paris; Professor Douglas James of the University of Arkansas; Mr. P.L. Brant of U.N.I.D.O.; Messrs. R.R. Whitson and T. Bradley, of Du Pont de Nemours Inc., of Wilmington, U.S.A., and of South Africa respectively; Dr. R.H. Le Pelley, formerly Senior Entomologist, Department of Agriculture, Kenya; Mr. William G. Hamilton, Works Manager, Eastern Nitrogen Limited, Newcastle, N.S.W., Australia; Mr. J.D. Pearson, Librarian, School of African and Oriental Studies, University of London and Library Adviser to the International University Council; Mr. D.I. Hodgson of Blyth, Green, Jourdain & Co. Ltd., London ; and Mr. Kai Curry-Lindahl, Expert in ecology and conservation for Africa, U.N.E.S.C.O., and U.N.D.P., Field Science Office for Africa, Nairobi.

Research Visitors, Study Groups and Advisers

The following visitors spent some time working at the M.S.I.R.I., or else called at the Institute on one or more occasions, while on mission to Mauritius during the year: a delegation from the *Academia de Ciencias de Cuba* composed of Messrs Edoy Sosa, Manoel Anderez and Jorge Aloma; a delegation from Malaysia made up of Tan Sri Dr. Lim Swee Aun, Chairman, Board of Directors, Perlis Plantations Ltd., accompanied by Messrs Leng Hin Why, Mechanical Engineer, Yeap Kuo Sheng, Agronomist, and Li Heng Tiong, Civil Engineer, Federal Land Development Authority, Malaysia; Mr. S.F. Trivedi, Manager, and Mr. Atmansingh Segan, Engineer, of Madhavani Sugar Works, Uganda; M. Jean Champion, Head of the Department in charge of banana cultivation at the *Institut Français de Recherches Fruitières Outre-Mer* (I.F.A.C.) ; Professor H.J. Moore, Director, Bailey Hortorium, Cornell University, who studied palms of the Mascarene area; Dr. D.J. Greathead, of the East African Station of the Commonwealth Institute of Biological Control, who studied biological control problems, and also collected predators of the sugar cane scale insect for importation into East Africa; Mr. Manfred Golly, Chief Librarian of the *Institut für Zuckerindustrie*, Berlin, who assessed the library collections of the M.S.I.R.I., discussed with the Librarian of the Research Institute particulars of cataloguing rules to be adopted in the preparation of a combined catalogue of the two Institutes; Mr. J. Collins, Engineer of the Tropical Products Institute, England, who advised on problems related to the drying and decortication of groundnuts; Dr. Maxwell Doty, of the University of Hawaii, who worked in the Herbarium on a study of the marine algae of Mauritius; M. P. Pourrut, *Chef de la Section Hydrologie*, O.R.S.T.O.M., Tananarive; Mr. Andres Sanchez Llosa, *Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières* (I.R.A.T.) Paris, on a one-month study tour at the Institute ; Mr. Antonio

Amorim, Agronomist from Brazil, and four Agronomists from Réunion Island who spent one and two weeks respectively, working at the M.S.I.R.I.

Aimé de Sornay Scholarshlp

The scholarship was awarded in 1971, for the first time, to a girl, Miss Sew Yoon Yip Hoi Yen, who came out fourth, with 71.7% of the marks, at the entrance examinations of the University of Mauritius held in April. The other two scholars are Mr. Hubert Chaillet and Denis Pilot. It is very gratifying to note that Mr. L.C.Y. Li Sui Fong, who was also a holder of the Aimé de Sornay Scholarship, obtained the Laureateship of the College of Agriculutre and is at present pursuing his studies in Food Technology at the University, Reading.

Acknowledgments

In concluding the General Section to this report, I should like to record, once again, my gratitude to Estate Managers and their personnel, with a special word for the Estate Agronomists, for all the facilities granted and the close co-operation in the conduct of experimental work. I also wish to express my thanks to the Chief Agricultural Officer, Agricultural Services, Ministry of Agriculture and Natural Resources, and his staff for their collaboration. May I say how grateful I am to the U.S. Ambassador and the African-American Institute for the fruitful visit I paid to the United States in connection with Food Crops research, and to the *Institut für Zuckerindustrie*, Berlin, for the assistance received from their Chief Librarian during his stay in Mauritius, and to the Overseas Development Administration which kindly made available the services of Mr. G. Collins of the Tropical Products Institute. To the Chairman and Members of the Executive Board, I am indebted for their advice and support and, finally, it is a pleasure to express my appreciation of the loyal assistance given by the staff during the year.

Technical Report

SUGAR CANE

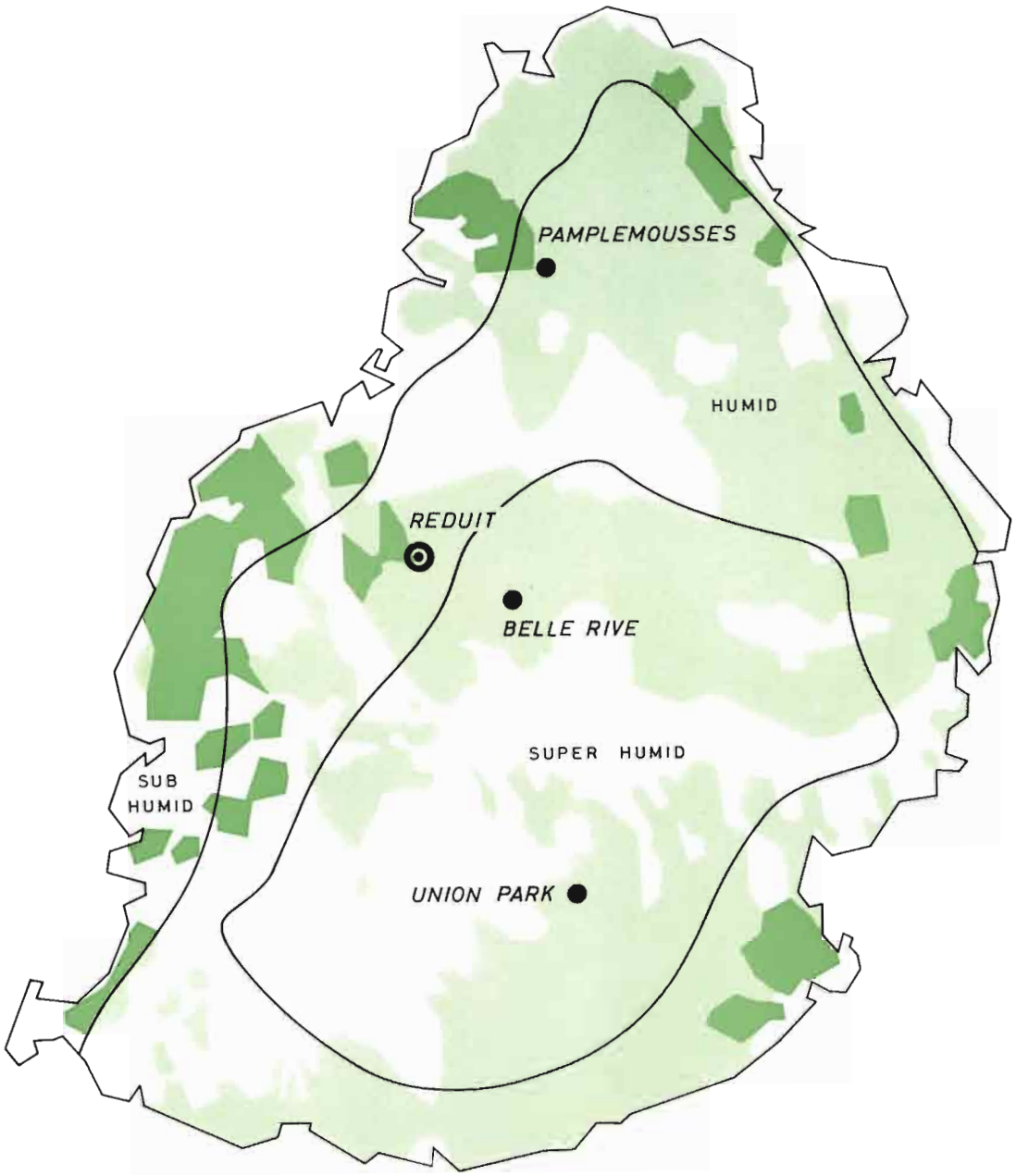


Fig. 1. Map of Mauritius showing the three main climatic zones and Experiment Stations (light green : area under sugar cane ; dark green : irrigated area)

General description of sugar cane sectors in Mauritius

Sector		*West*	*North*	*East*	*South*	*Centre*
Districts		Black River	Pamplemousses & R. du Rempart	Flacq	Grand Port & Savanne	Plaines Wilhems & Moka
Orientotion		Leeward	—	Windward	Windward	—
Physiography		Flat & sloping	Lowlands	Flat & sloping	Flat & sloping	Plateau
Geology		Late lava — Pleistocene				
Petrology		Compact or vesicular doleritic basalts and subordinate tuffs				
Pedology		Soil Families				
Low Humic Latosol		«Richelieu»	«Richelieu» «Réduit»	«Réduit» «Bonne Mère»	«Réduit»	«Réduit» «Ebène»
Humic Latosol		—	«Rosalie»	—	«Riche Bois»	«Riche Bois»
Humic Ferruginous Latosol		—	—	«Sans Souci»	«Belle Rive» «Sans Souci» «Midlands» «Chamarel»	«Belle Rive» «Sans Souci» «Midlands»
Latosolic Reddish Prairie		«Médine»	«Labourdonnais» «Mont Choisy»	«Mont Choisy»	«Labourdonnais» «Mont Choisy»	«Médine»
Latosolic Brown Forest		—	—	«Rose Belle»	«Rose Belle» «Bois Chéri»	«Rose Belle» «Bois Chéri»
Dark Magnesium Clay		«Lauzun» «Magenta»	«Lauzun»	—	—	—
Grey Hydromorphic		«Balaclava»	«Balaclava» «St. André»	«Balaclava»	—	—
Low Humic Gley		—	—	«Valetta»	—	«Valetta» «Petrin»
Lithosol		—	«Melleville»	«Pl. des Roches» «Melleville»	«Melleville»	—
Altitude		Sea level-275 m	Sea level - 175 m	Sea level - 350 m	Sea level - 350 m	275 - 550 m
Humidity province		Sub-humid	Sub-humid to humid	Humid to super-humid		
Annual rainfall, mm. range		1125 (750-1500)	1400 (1000-1900)	2400 (1500-3200)	2300 (1500-3200)	2600 (1500-3800)
Months receiving less than 50 mm.		June to October	September to October	None		
Average temperature °C	*Jan.*	27.0°	26.5°	25.5°	25.0°	23.5°
	Jul.	21.0°	20.5°	19.5°	19.0°	17.5°
Cyclonic winds, exceeding 50 km/h during 1 hour		December to May				
Irrigation (area in ha)						
Overhead	intensive	1253	1110	703	520	392
	occasional	—	492	633	440	—
Surface	intensive	2696	713	282	818	599
	occasional	395	1178	215	148	435
Area (1000 ha)	Total	24	38	30	68	27
	Under cane	5	23	20	27	11
Cane production, 1971 (1000 tonnes)		360	1034	1347	1746	769
Sugar production, 1971 (1000 tonnes)		44	122	155	210	90

TECHNICAL REPORT

THE 1971 SUGAR CROP

Climatic conditions which prevailed during the growth period of the 1971 sugar cane crop have been dominated by a drought extending for 75 days between the 10th of February and the 25th of April.

As usual, the drier sectors, West and North, have been the more severely affected as regards cane yield.

The drought, most probably, resulted from the unusual fact that no cyclone passed between Mauritius and the central part of the East Coast of Madagascar during the year 1971.

On the other hand, climatic conditions involving no rain excess associated with low minimum temperature during the maturation period, were conducive to excellent quality of the harvested cane.

The more important data for the 1971, compared to the 1970, campaign are :

	*1971**		*1970**	
Area cultivated, hectares	86,603	(205,220)	86,520	(205,024)
Area harvested, hectares :				
Miller-Planters	43,000	(101,900)	42,662	(101,093)
Planters	36,877	(87,400)	37,722	(89,390)
Total	79,877	(189,300)	80,384	(190,483)
Weight of canes, tonnes	5,255,570		5,119,995	
Tonnes cane per hectare :				
Miller-Planters	79.9	(33.7)	74.6	(31.5)
Planters	49.4	(20.9)	51.7	(21.8)
Average, Island	65.9	(27.8)	63.8	(26.9)
Commercial sugar recovered % cane	11.82**		11.25***	
Tonnes sugar per hectare :				
Miller-Planters	9.44	(3.98)	8.39	(3.54)
Planters	5.82	(2.46)	5.81	(2.45)
Island	7.78	(3.28)	7.18	(3.03)
Total duration of harvest (days, Sundays and public holidays excluded)	152		137	
Sucrose % cane	13.41		12.86	
Fibre % cane	13.19		13.17	
Tonnes sugar 98.8° pol.	621,100		576,204	

Essential information concerning climatic factors, cane and sugar yields, sucrose content and varietal replacement are given in figs. 2-7.

* Equivalent figures for arpents given in brackets

** Equivalent to 8.5 tonnes of cane per tonne of sugar

*** Equivalent to 8.9 tonnes of cane per tonne of sugar

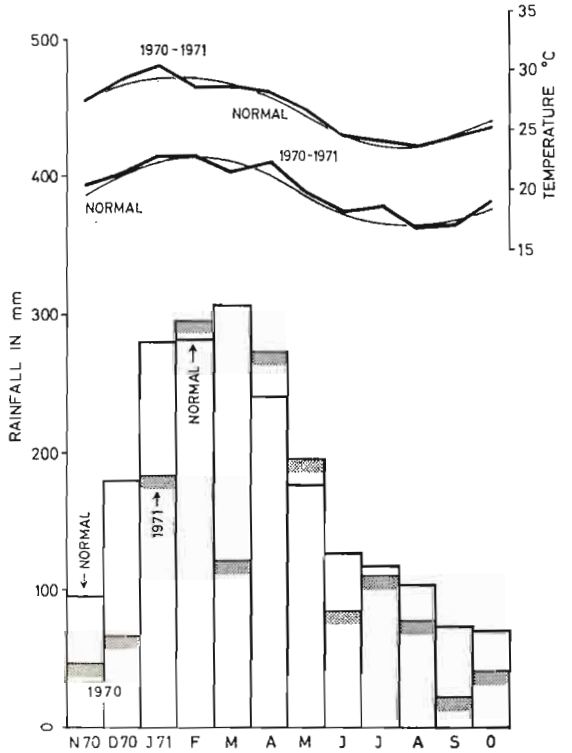


Fig. 2. Average rainfall, maximum and minimum temperatures over the cane area of Mauritius in 1971, compared to normal

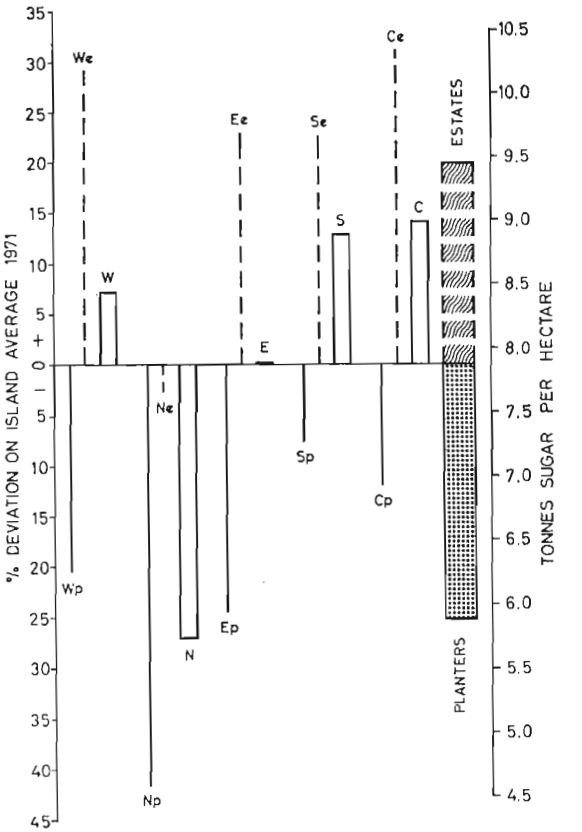


Fig. 3. Relative yields of sugar/ha in different sectors. Av. island yield 7.87 tonnes of 98.8 pol. sugar/ha (3.32 tonnes/arp.). Plain line : planters ; broken line : estates ; columns : sector average

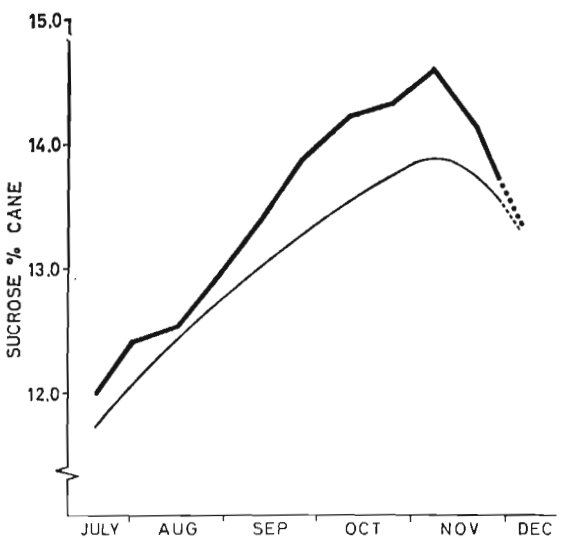


Fig. 4. Variation in sucrose % cane during the harvest season of 1971 (bold line) compared to the 1966-1970 average (fine line)

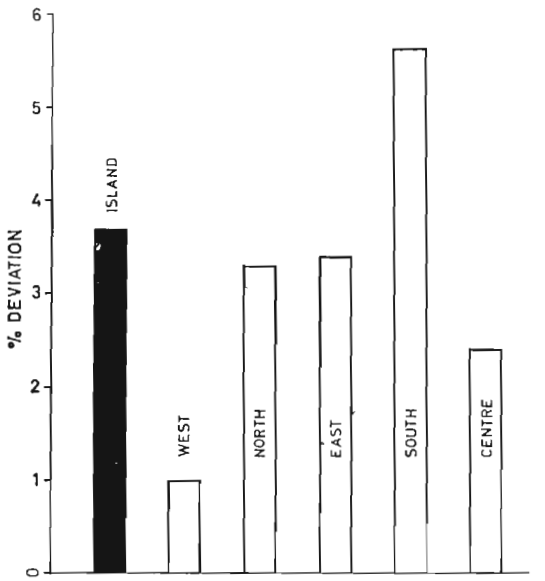


Fig. 5. Sugar manufactured % cane in 1971 for the various sectors, expressed as % deviations from the 1966-1970 averages

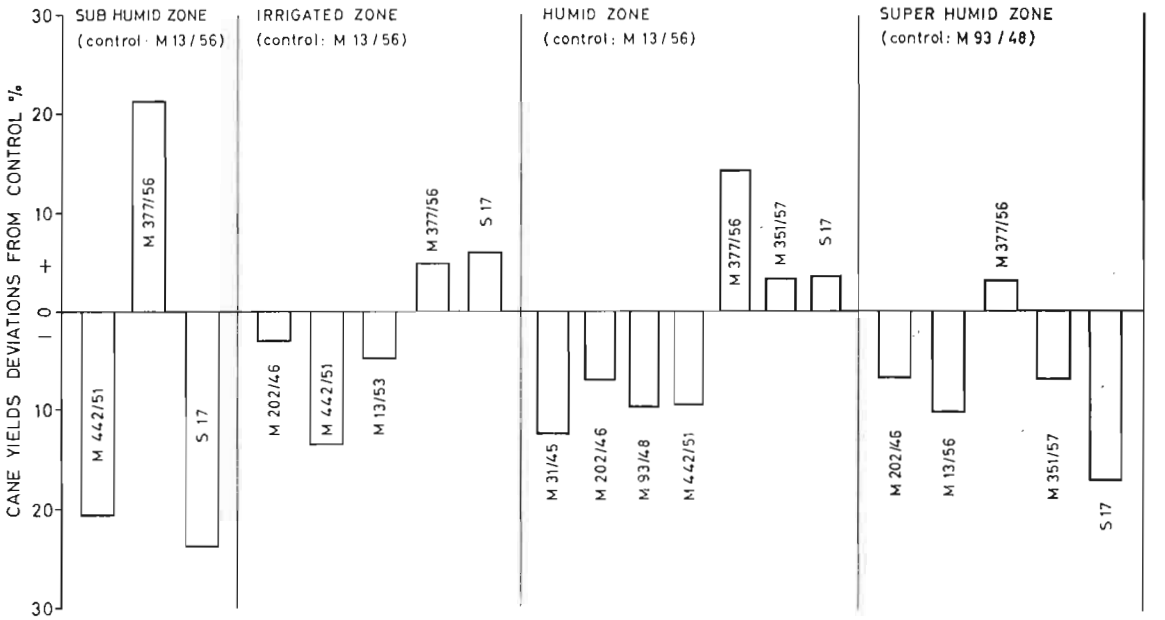


Fig. 6. Yields of cane varieties on estates in 1971, expressed as % deviation from standard varieties in the same categories in the four climatic zones.

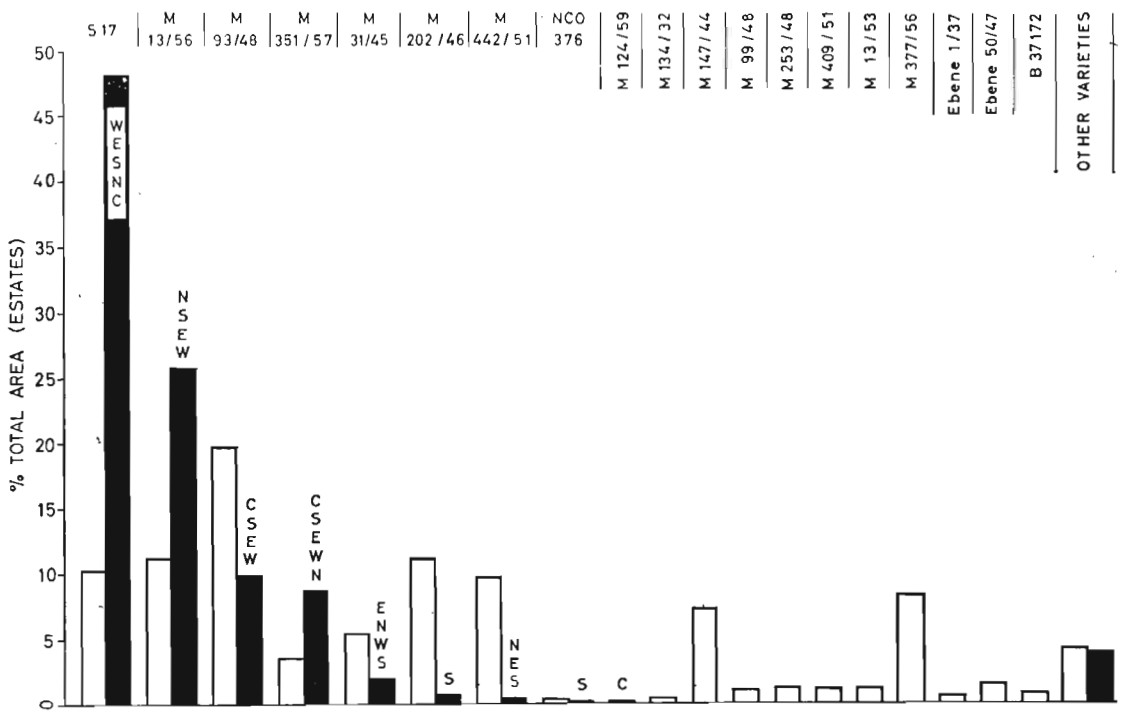


Fig. 7. Varietal trend in 1971, as illustrated by area under cultivation (plain column) and area planted during the year (black column). Letters denote sectors arranged in descending order of magnitude of plantations.

BREEDING

Fuzz, seeds and seedlings of sugar cane

Overleaf.· Flowering S 17 growing at high altitude

BREEDING

CROSSING

The crossing period extended from 11th May to 30th July, an overall period of 11 weeks. A total of 1203 crosses were made involving 408 combinations, and 210 different parents comprising 46 clones as males, 129 as females, and 35 as both male and female. The nobilization programme accounted for 150 crosses involving 85 combinations. Seedling production was in excess of requirements leading to an initial random discard from all combinations producing more than 375 seedlings. The M 71 series was transplanted to the fields during the second fortnight of February 1972 and involved 19,787 locations totalling 39,495 seedlings; the nobilization programme involved 2,662 locations totalling 6,412 seedlings.

SELECTION

Preliminary phase

The M 69 series occupied 23,685 locations in the field and involved 95,109 seedlings. As the maximum number of varieties which can be dealt with at the next stage (Bunch Selection Plots) varies around 20,000, it was decided that only 250 locations would be examined for all combinations bunch planted and represented in the field by a greater number of locations.

100 low Brix varieties were selected from Bunch Selection Plots and planted in 2 environments in propagation plots. This was done in order to obtain preliminary information on whether rejection for low Brix in July is justified in the light of Brix obtained later in September-October.

The summary of Variety Testing in 1971 is outlined on p. 37

Multiplication of Varieties

Approximately 3.37 ha (8 arpents) of Multiplication Plots and Nurseries involving 85 varieties were established at Médine Boule Terre in 1971. The 1st Nursery mentioned in the Annual Report for 1970 was implemented for the first time in 1971 and involved 3 varieties. These Nurseries were planted at two different times, namely June and October. All planting material used for Multiplication Plots was subjected to the short hot-water treatment of 52°C during 20 minutes, whereas for planting Nurseries, varieties were subjected to the long hot-water treatment of 50°C during 2 hours. 192,960 cuttings were delivered from Multiplication Plots to plant trials at the final phase.

Final Phase

Policy

It is fitting here to review briefly the evolution of the method of testing varieties at the final phase. Prior to 1963, varieties were tested in one environment at a time; this system made decisions on the potential value of varieties difficult. From 1963 to 1967, most varieties were planted simultaneously in 4 environments. No trials were planted in 1968, and in 1969, a system of re-testing was implemented.

It was mentioned in the Annual Report for 1970 that further testing at a late stage was being envisaged. The problem has been investigated further, and it has been decided that a third series of trials, to be known as third testing, will be planted in future. The candidates to plant these trials will normally come from varieties planted in the 1st Nursery. (*vide Rep. Maurit. Sug. Ind. Res. Inst.*

17(1969): 51, fig. 18). The trials will be carried out by Estate Agronomists and co-ordinated by the Liaison Officer. Sampling will be conducted during the two halves of the crop period. The siting of trials has also been reconsidered during the year. Eight types of site have been designated, based mainly on soil types and families. They should be more representative of the environment under which sugar cane is grown in Mauritius and should therefore enable a clearer picture on the potential of varieties under different conditions of soil and climate to be obtained. The 1st and 2nd testing involving series of 4 trials each will be established so as to be sited on the 8 locations selected. The 3rd testing will be established simultaneously on the 8 sites. The problem of co-ordinating multiplication of varieties prior to distribution at release is currently under further investigation and solutions will soon be proposed.

Experimental work

i) 1st Testing: Variety Trials

Two series of trials were planted in 1971. One series included 12 varieties laid out as 4 × 4 triple lattice and the other series included 16 varieties laid out as 4 × 5 rectangular lattice. As usual each series consists of 4 trials, one in each of the four main climatic zones of the island; the number of replicates at each site was 3. A summary of the origin of all varieties being tested at this stage of selection is given in Table 1.

ii) 2nd Testing: Trials in collaboration with Estate Agronomists or with Field Officers

As it appears that some confusion exists on the real objective of the second stage of testing which may imply two operations, the new definition given above has been adopted. Indeed, one operation is conducted by Estate Agronomists, the candidates for these trials being the best varieties earmarked every year from the 1st testing (Variety Trials). The second operation, formerly known as Final Test Trials, which may not necessarily have to be conducted, are planted and harvested by field officers of the Institute, and the candidates planted are those left over when Variety Trials, i.e. the 1st testing, are nearing the 3rd ratoon stage. There is, however, no hard and fast rule, and, depending on the number of varieties which need re-testing each year, these last two stages can be combined. The Institute designs all these trials, carries out all the laboratory determinations as well as all the relevant statistical analyses of data.

Two series of 4 trials were planted during 1971: one by Estate Agronomists and the other by Field Officers. Both were laid out as 4 × 4 balanced lattices with 5 replicates and comprised 11 varieties. The first series included 8 varieties from Variety Trials planted in 1969, and 3 varieties from Variety Trials planted in 1967. The second included 4 varieties from Variety Trials planted in 1964, 2 varieties from Variety Trials planted in 1965, 4 varieties from Variety Trials planted in 1966 and one variety from Variety Trials planted in 1969. A summary of the origin of all varieties in the 2nd testing is given in Table 2.

iii) 3rd Testing

No trials were planted in this series in 1971.

Final assessment of trials

i) 1st Testing : Variety Trials planted in 1967

This series of trials was harvested in 3rd ratoon in the last fortnight of October 1971; a summary of results is presented on p. 39

Summary of variety testing in 1971

(i) Stages selected

	Stage	Series	Crop cycle reached	Population measured		Population selected	
				Different varieties	*Total locations*	*Different varieties*	*Total locations*
1.	Seedling	M/69	Plant cane	49,785	15,194	17,099	17,099
2.	Bunch Selection Plot	M/68	Plant cane	10,744	10,744	2,130*	3,710*
3.	Propagation Plot	M/64	1st Ratoon	8	16	—	—
	,, ,,	M/66	,,	1872	3426	167	184
	,, ,,	*Total*		*1880*	*3442*	*167*	*184*
4.	1st Selection Trial	M/62	2nd Ratoon	14	14	—	—
	,, ,,	M/63	,,	88	88	14	14
	,, ,,	*Total*		*102*	*102*	*14*	*14*
		Grand total		*62,511*	*29,482*	*19,410*	*21,007*

(ii) Stages measured

3.	Propagation Plot	M/66	Plant Cane	1237	1991
	,, ,,	M/67	,, ,,	1553	2364
	,, ,,	*Total*		*2790*	*4355*
4.	1st Selection Trial	M/63	1st Ratoon	59	67
	,, ,,	M/64	,,	37	41
	,, ,,	Foreign	,,	40	80
		Total	,,	*136*	*188*
	,, ,,	M/64	Plant Cane	164	182
		Grand total		*3090*	*4725*

(iii) Stages planted

1.	Seedling	M/70	47,396	19,612
2.	Bunch Selection Plot	M/69	17,099	17,099
3.	Propagation Plot	M/68	2,130	3,710*
4.	1st Selection Trial	M/66	167	184
	,, ,,	Foreign	18	36
	,, ,,	*Total*	*185*	*220*
		Grand Total	*66,810*	*40,641*

* Excluding 100 varieties in 200 locations mentioned in text

Table 1. Varieties planted in 1st Testing :

Variety Trials

Varieties	*1969*	*1970*	*1971*	*Total*
M/59 Series	7	1	—	8
M/60 Series	19	1	—	20
M/61 Series	6	9	1	16
M/62 Series	—	4	25	29
Sub-Total	*32*	*15*	*26*	*73*
Foreign Varieties	—	6	2	8
Total	*32*	*21*	*28*	*81*
No. of series	2	1	2	5

Table 2. Varieties planted in 2nd Testing :

Trials in collaboration with Estate Agronomists or Field Officers

Varieties	*1969*	*1970*	*1971*	*Total*
M/51 Series	2*	—	—	2
M/53 Series	3	—	—	3
M/54 Series	2	—	1	3
M/55 Series	—	3	2	5
M/56 Series	1	6	—	7
M/57 Series	4**	3	3	10
M/58 Series	1	1	2	4
M/59 Series	8***	—	6	14
M/60 Series	—	—	6	6
M/61 Series	1****	—	—	1
Sub-Total	*22*	*13*	*20*	*55*
Foreign Varieties	2‡	1	1	4
Total	*24*	*14*	*21*	*59*
No. of series	2†	1	2	5†

* Variety M 428/51 was planted in Estate Agronomist trial in 1969 and also in special Final test in 1969

** Of which one variety released 1970, namely : M 351/57

*** Of which two varieties released 1971, namely : M 124/59 & M 438/59

**** Variety M 907/61 was planted in 1969 in special Final Test & in 1971 in Normal 2nd Test : Estate Agronomist.

‡ Of which one variety released 1970, namely : S 17

† One of these series planted in 1969 was a special Final Test and included only 2 trials: the total 5 series under test therefore include only 18 trials.

Results of Variety Trials planted in 1967

(based on results of 1st to 3rd ratoon for all trials except one for which complete results of plant cane are also available)

Varieties planted	:	43
Varieties discarded	:	40
Varieties released	:	—
Varieties re-tested in 1971	:	3
Varieties for re-testing in 1972	:	—

Analysis of discarded varieties

Reaction to gumming disease	*M/Varieties*	*Others*	*Total*
Highly susceptible	10	—	10
Susceptible	10	—	10
Slightly susceptible	8	—	8
Resistant	12	—	12
Total	*40*	—	*40*

List of discarded varieties

Varieties highly susceptible to gumming disease :

M 59/59, M 134/59, M 493/59, M 597/59, M 1107/59, M 1308/59, M 1344/59, M 42/60, M 121/60, M 210/60.

Varieties susceptible to gumming disease :

M 420/59, M 549/59, M 1217/59, M 1224/59, M 15/60, M 24/60, M 74/60, M 77/60, M 116/60, M 132/60.

Varieties slighly susceptible to gumming disease :

M 599/59, M 1231/59, M 1247/59, M 1299/59, M 25/60, M 46/60, M 122/60, M 169/60.

Varieties resistant to gumming disease :

M 533/57, M 349/59, M 869/59, M 1024/59, M 1161/59, M 1237/59, M 21/60, M 83/60, M 99/60, M 107/60, M 120/60, M 147,60.

Varieties being re-tested

The characteristics of the three varieties planted in 2nd tests by Estate Agronomists in 1971 are listed below :

Varieties	*Parents*	*Characteristics*
M 145/59	B 34104 x M 63/39	An average performer in the sub-humid & irrigated area; as this variety was found susceptible to gummosis after the trial was planted, it now stands no chance of being released.
M 738/59	M 99/48 x 47 R 2777	Rich variety, showing signs of adaptation to sub-humid conditions. Slightly susceptible to gumming disease and susceptible to smut.
M 90/60	N Co 376 x CP 3613	A good yielder with sucrose content rather on the low side; as this variety was found susceptible to gummosis after the trial was planted, it now stands no chance of being released.

ii) 2nd Testing: Trials in collaboration with Estate Agronomists or with Field Officers

Cumulative results of plant cane & 1st ratoon for the special Final Tests planted in 1969 are worth considering here; they are presented in Table 3. These results again indicate that when harvested late in the season, M 351/57 compares very favourably with M 93/48, M 377/56 & S 17. Its sucrose content does not appear to be different from that of M 93/48 or M 377/56; further on the poor Humic Ferruginous Latosols at higher altitude it appears to be the leading variety. It should be stressed once more, however, that this variety should under no circumstances be harvested before the middle of October; it would therefore be wise to restrict the plantings of this variety to specific areas.

iii) Further testing

A series of 30 trials, carried out by Estate Agronomists and co-ordinated by the Liaison Officer was harvested in plant cane in 1971 and results analysed fully; these trials had been planned approximately on the lines to be followed for the 3rd testing as already defined.

Table 3. Performance of standard varieties in special 2nd Testing

Cumulative Results : plant cane + 1st Ratoon*

Estate	*Mon Desert-Alma*				*Beau Champ*			
Section	Valetta				Belle Rive			
Soil Type & Family	F 1				H 2			
Altitude (m)	400 (1400 ft)				120 (400 ft)			
Normal Rainfall (cm)	300 (120 in)				300 (120 in)			
Date & Age (wks) Harvested : P. Cane	3.11.70 : 62				4.11.70 : 63			
Date & Age (wks) Harvested : 1 R.	12.11.71 : 53				9.11.71 : 53			
	W	*I*	*S*	*P***	*W*	*I*	*S*	*P***
Standard Error of one variety	±2.89 (1.22)	±0.18	±0.33 (0.14)	±0.24 (0.10)	±3.17 (1.34)	±0.17	±0.43 (0.18)	±0.31 (0.13)
Varieties								
M 93/48	75.1 (31.7)	10.4	7.8 (3.3)	4.7 (2.0)	105.9 (44.7)	12.2	13.0 (5.5)	8.8 (3.7)
M 377/56	66.1 (27.9)	10.4	6.9 (2.9)	4.3 (1.8)	112.5 (47.5)	12.5	14.0 (5.9)	9.7 (4.1)
M 351/57	83.4 (35.2)	10.2	8.5 (3.6)	5.2 (2.2)	105.9 (44.7)	12.6	13.3 (5.6)	9.0 (3.8)
S 17	68.0 (28.7)	10.7	7.3 (3.1)	4.5 (1.9)	93.8 (39.6)	14.4	13.5 (5.7)	9.7 (4.1)
Average Standards	73.2 (30.9)	10.4	7.6 (3.2)	4.7 (2.0)	104.5 (44.1)	12.9	13.5 (5.7)	9.2 (3.9)
Average Trial	69.2 (29.2)	10.8	7.3 (3.1)	4.7 (2.0)	92.6 (39.1)	12.8	11.6 (4.9)	8.1 (3.4)

* Individual results based on 5 replicates in each trial.

** W = Tonnes cane/ha (tonnes cane/arp in brackets)
I = Industrial Recoverable Sugar % Cane
S = Tonnes sugar/ha (tonnes sugar/arp in brackets)
P = Tonnes Profitable Sugar/ha (Tonnes Profitable sugar/arp in brackets)

Release of Varieties

Analysis of results available from 2nd tests: Estate Agronomists, planted in 1969 have confirmed results already available for varieties M 124/59 & M 438/59.

M 124/59: appears to be better suited to late harvest; it has good ratooning vigour, covers the ground rapidly but has a tendency to lodge.

M 438/59: is an erect cane with many canes per stool; it shows signs of adaptation to dry conditions and may well be suited to harvest throughout the crop.

These two varieties have therefore been recommended for release to the Cane Release Committee at a meeting held on 29th December 1971 and unanimously accepted. The Board of Agriculture, Fisheries and Natural Resources having concurred with this decision, legislation to add these two varieties to the approved list is pending at the time of writing.

As more information will be forthcoming on these two varieties from trials of the 2nd test series as well as from the trials analogous to the 3rd test series mentioned above, their merits and shortcomings will be reviewed during the next few years. It should be mentioned however, at this stage, that S 17 should be planted in preference to these two varieties whenever it is performing best particularly for early harvest when it is still the variety to beat.

The Variety Situation

With the release of two varieties in 1970 and two other in 1971, the variety situation is improving rapidly after the major set back resulting from the epidemic of gummosis.

The following are the major varieties recommended for planting, listed in the order in which they may be harvested:

Sub-humid conditions	:	S 17, M 13/56, M 438/59
Humid conditions	:	S 17, M 13/56, M 93/48, M 438/59, M 31/45, M 124/59
Super-humid conditions	:	S 17, M 438/59(?), M 93/48, M 124/59, M 351/57.

MISCELLANEOUS

Reports on feasibility studies made by two computer firms represented in Mauritius were submitted in December 1971. It is hoped that a decision concerning the eventual change over to computer can be reached before the end of June 1972.

The Biometrician, head of the Plant Breeding Division, went on overseas leave in Europe early in the year and as usual spent some time visiting research institutions and establishing or renewing contacts. He also paid short visits to Australia & Hawaii on his way to the ISSCT 14th Congress in Louisiana. As Head of the Plant Breeding Division he was appointed official correspondent of the Commonwealth Bureau of Plant Breeding & Genetics.

One televison talk was made on Cane Varieties.

Mr. S. de Villecourt, Scientific Assistant in the Plant Breeding Division has emigrated to Australia.

APPENDIX

List of Approved Cane Varieties 1972

Varieties	*Cane Release Advisory Committee Meeting*	*Proclamation*
B 37161	26. 3.53	5 (*1956*)
B 37172	26. 3.53	5 (*1956*)
E 1/37	1951	5 (*1956*)
E 50/47	29.12.61	18 (*1962*)
M 134/32	1937	10 (*1946*)
M 134/32 — Striped	16.12.55	5 (*1956*)
M 134/32 — White	16.12.55	5 (*1956*)
M 147/44*	13.12.55	5 (*1956*)
M 31/45	13.12.55	5 (*1956*)
M 202/46	8.12.59	13 (*1960*)
M 93/48	8.12.59	13 (*1960*)
M 99/48	12. 2.65	20 (*1966*)
M 253/48	29.12.61	18 (*1962*)
M 409/51	24. 5.66	20 (*1966*)
M 442/51	18. 2.64	20 (*1966*)
M 13/53	24. 5.66	20 (*1966*)
M 13/56	24. 5.66	20 (*1966*)
M 377/56**	15.12.66	3 (*1967*)
M 351/57	18. 9.70	*Pending*
M 124/59	29.12.71	*Pending*
M 438/59	29.12.71	*Pending*
N Co 376	24. 5.66	20 (*1966*)
S 17	28. 8.70	*Pending*

* To be uprooted before 31st December 1973 (Proclamation 3 of 1967)

** Legislation to stop planting, pending.

SOILS
AND
PLANT NUTRITION

Effect of potassium deficiency on cane growth, potassium-deficient cane in the foreground and control in the background

Overleaf : Sugar cane growing on very rocky soil (Latasolic Reddish Prairie) at Mon Trésor-Mon Désert

SOILS AND PLANT NUTRITION

Land resource survey

Land resource survey and mapping have been carried out in conjunction with Dr. E.Z. Arlidge of FAO (under U.N.D.P./T.A. Country Projects) who is attached to the Institute.

Land capability classification of Mauritius and Rodrigues

The main project has been the preparation of the Land Capability Classification of Mauritius and Rodrigues. Landform analysis was undertaken by means of the stereoscopic examination of aerial photographs, followed by the mapping of unit landform and slope classes. Slope classes were confirmed by measurement in the field and more detailed soil surveys were necessary, particularly in the Central Uplands. The capability map of Mauritius is now in the final stages of preparation.

In November 1971, a land resource reconnaissance survey of Rodrigues was undertaken by Dr. Arlidge and Mr. Jhoty. During their five weeks' stay, as much information as possible on the geomorphology, climate, soil and water resources of that island was gathered for the purposes of land capability classification.

Land use recommendations

A short study carried out on behalf of the Government Economic Planning Unit has revealed that out of 128,000 arpents of waste land, calculated from the Land Use Survey of 1965, 24,000 arpents were potentially cultivable.

Following a request from the Ministry of Agriculture and Natural Resources, the extent of wasteland, marginal for sugar cane but suitable for tea occurring on the sugar estates of Rose Belle, Britannia and Union St. Aubin, was determined. No wasteland suitable for tea was available.

Similar surveys were carried out for the Tea Development Authority and sugar estates in four specific areas of the Central Uplands. Areas suitable for tea were marked out, and general land use recommendations also made.

In accordance with a feasibility study of a Government irrigation project at Palmar, a soil reconnaissance survey was undertaken to provide information on soil types and moisture holding capacity.

Requirements of land for deer and cattle farming were discussed with experts of the UNDP-SF/FAO Milk and Meat Project.

A planned lay-out of the soil groups, landform and terrain characteristics of the Midlands area was prepared for the Development Works Corporation.

For the purposes of conservation of watersheds, the catchment areas of Mare-aux-Vacoas and Piton du Milieu were demarcated by means of aerial photo-interpretation.

SOIL CHEMISTRY

Behaviour of potassium in Mauritius soils

Preliminary study of the factors determining uptake of potassium

Results of pot experiments with sorghum showed that uptake of potassium was significantly correlated with soil exchangeable K and K-activity ratio before potting and the decrease in exchangeable K and in activity ratio with cropping.

In all cases the total K-uptake by sorghum exceeded the amount of K provided in exchangeable forms, and the different soils varied in their ability of releasing K from non-exchangeable forms.

Quantity/Intensity Curves of Great Soil Groups of Mauritius

Basic studies on the behaviour of potassium in our soils were carried out. Two factors were specially important : the availability of potassium (activity ratio of potassium) and the amount of available potassium (labile potassium).

A comparison between Mauritius and Hawaii soils revealed higher activity ratios but lower labile potassium for Mauritius soils. Also, equilibrium was reached very much quicker with our soils. For both Hawaiiam and Mauritius unfertilized soils, the activity ratios decreased with increasing rainfall.

Comparison of extractants for removing soil K

Three extractants were compared and their soil extraction potentials (i.e. the extent to which the K potential falls in a soil as K is extracted) estimated.

The values obtained were :

Leaching with neutral N NH_4OAc	:	-4101 ± 423 cal. equiv.$^{-1}$
Shaking for 1 hour with ,,	:	-4295 ± 325 cal. equiv.$^{-1}$
Boiling with 1 N HNO_3	:	-4402 ± 450 cal. equiv.$^{-1}$

The more negative the soil extraction potential, the more K the extractant removed.

The three methods of extraction were significantly correlated among themselves, and three repeated extractions with boiling nitric acid significantly removed more potassium than did one single extraction. The nitric acid method was adopted for routine purposes.

Correlation between soil and sugar cane leaf potassium

A correlation was obtained between soil K as extracted by nitric acid and leaf K, both for the Latosols and Latosolic soils figs 8 (a,b).

The soil threshold for the Latosols works out to be between 0.2 - 0.3 m.e. K%, while that of the Latosolic soils is very much higher and depends on the degree of rockiness, as well as the moisture status of the area.

These thresholds are now being checked on a field basis.

Information derived from Réduit Permanent Trials

Quantity/Intensity curves of soils from NPK and NP plots were almost identical. These plots have been treated as indicated for the past 36 years.

A study of the lateral distribution of K in the soil showed that concentration of K was highest in the cane lines and lowest in the mid-interrow.

The interrow of the NP plots had a very much lower K status than the corresponding sample of the NPK plots.

Fluctuations in both the row and interrow potassium occurred during the period under study (January to April).

Vertical movement of potassium

After an initial washing out of soluble potassium salt, potassium was held by the soil and resisted very heavy downpours. During the two months the study lasted, plots treated with KCl were always higher in K than the untreated plots.

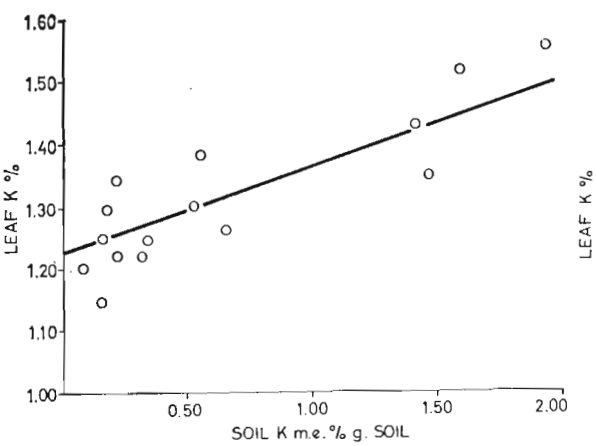
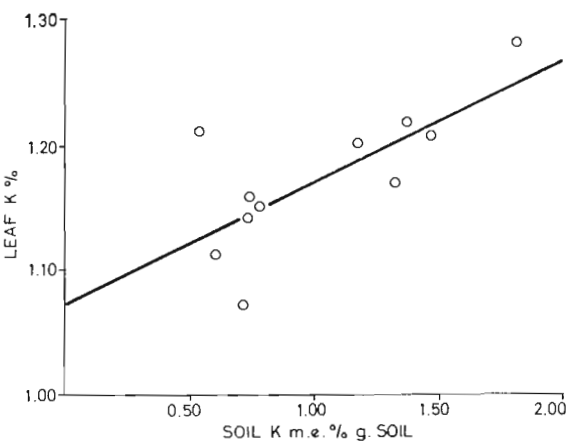


Fig. 8. (a) Relationship between soil K and leaf K in latosols.



(b) Relationship between soil K and leaf K in latosolic soils.

Nitrogen

Mineralisation of nitrogen

Studies on N-mineralisation in local soils have so far shown that both the Latosols and Latosolic soils mineralised nitrogen upon three weeks incubation, the range being 0-30 kg N per arpent for the Latosolic soils and 0-20 kg N per arpent for the Latosols. The amount of N mineralised was not correlated with the organic matter content while the correlation between C/N ratio and mineralised N approached significance at 5% level.

The Latosols gave a significant negative correlation between mineralised-N and response to N (r = 0.707* d.f. = 8) but this relationship was not obtained in the Latosolic soils.

Soil acidity and liming

Exchangeable hydrogen was the only parameter to be correlated linearly to soil pH over a wide range, although definite curvilinear relationships were obtained between base saturation and pH, extractable Al and pH and exchange acidity and pH.

The buffer curves of the different Latosols showed almost similar behaviour towards liming, which allowed general liming recommendations to be made for these soil groups, according to the pH at start and the one to be attained. These recommendations are made to suit large scale acidity corrections. For more precise work, the soils are to be dealt with separately.

Soil silicon

Soil v/s leaf silicon thresholds

Samples of soil and sugar cane leaves from 21 sites were analysed for silicon. They were significantly correlated (r = 0.880** d.f. = 19), and gave regression line Y = 0.82 + 0.0056 X, where X = soil Si, Y = leaf SiO_2 % (fig. 9). If soil threshold of 125 ppm Si is substituted, the leaf threshold works out to be 1.52% SiO_2 which is in good agreement with the threshold of 1.50 established differently.

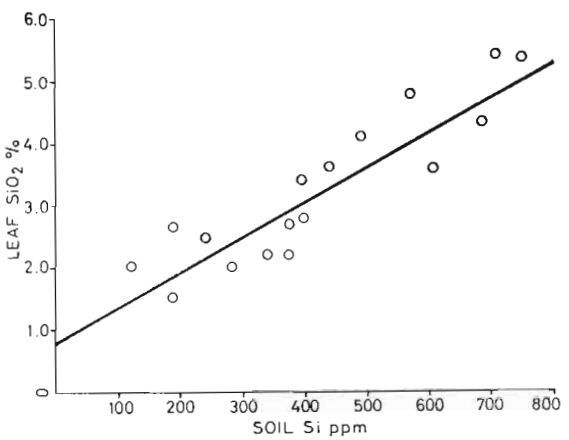


Fig. 9. Relationship between soil silicon and leaf silica levels of sugar cane

Soil analysis

About 1500 soil samples were analysed by Estate Chemists mainly for pH, P and Si. Potassium was also determined on about 450 samples.

SOIL PHYSICS

Irrigation

With the object of improving cane yields in the semi-arid and sub-humid climates, activities in soil physics were restricted to the improvement of irrigation practice which is still considered to be sub-optimal.

Results to-date indicate that cane plants are subjected to a severe moisture stress during the latter parts of the irrigation interval under present irrigation practice. On the other hand, practice based upon the 2 atm suction within the root zone for timing irrigation is giving encouraging results. Growth measurements have shown that cane growth was superior under the 2 atm suction practice than under current practice.

From investigations based upon the 2 atm suction within the root zone as the criterion for irrigating and upon a fixed irrigation interval so as to facilitate irrigators to follow a regular roster, the following provisional recommendations may be made :

(i) Young canes — (emergence up to full canopy). 25 mm water every week for Latosolic Reddish Prairie soils (LRP), 25 mm water every 10-12 days for Dark Magnesium Clays (DMC) and 40 mm water every 2 weeks for Low Humic Latosols (LHL).

(ii) Full canopy — (when plants have closed in). 38 mm water every week for LRP, 38 mm water every 10 days for DMC and 50-60 mm water every 2 weeks for LHL soils.

However, at this stage it is rather premature to give specific recommendations. Feasibility studies are necessary to evaluate the economics of different water régimes. In this connection, properly designed irrigation experiments will soon be set up in order to substantiate the present findings.

The water requirement at the maturation stage will also be investigated during the latter part of the irrigation experiments to be conducted.

In keeping with soil and water conservation, preliminary investigations have been carried out for not less than 7 sugar estates on soil water retention capacities with regard to irrigation improvement or development. The sugar estates in question are: Mon Désert Alma, Médine, Réunion, Riche-en-Eau, Beau Champ, Belle Vue Harel and Highlands. The soils in those localities are those actually under irrigation or to be irrigated; they belong to three main great soil groups, notably Low Humic Latosol, Latosolic Reddish Prairie and Dark Magnesium Clay. Although field work has been confined to sugar estates, the basic properties determined are applicable to other lands in the Northern Plairs and Western Coastal Regions.

Infiltration capacity

Data on soil infiltration capacities are essential in designing and operating any irrigation system. Previous work with the ring infiltrometers has given rather variable results on account of soil heterogeneity. It is thus felt that a sprinkler infiltrometer would provide more reliable and less variable results. The setting up of such an equipment is now under way.

Recently, the ring infiltrometers of the Soil Physics section (M.S.I.R.I.) have been used by the Hydrology section of the Ministry of Works (M.O.W.) Mauritius, for the determination of infiltration rates of soils under different types of vegetation in connection with research in river catchments initially set up under an F.A.O. project.

It is anticipated that this initial co-operation between M.S.I.R.I. and M.O.W. will lead to future joint investigations in problems allied to soil and water conservation.

Soil stability and erosion

With the sprinkler infiltrometer, studies will also be conducted to assess the extent of soil stability deterioration resulting from falling waterdrops on soil surfaces. Problems of soil erosion following impeded drainage will also be investigated.

FOLIAR DIAGNOSIS

Improved methods of elemental plant analysis

There is a need for the constant improvement of analytical techniques that combine simplicity and accuracy. The range of elements studied should also be as extensive as possible in order to reveal hidden deficiencies or excesses limiting crop production.

Nitrogen, phosphorus and potassium

The simultaneous determination of these three major nutrients from a single sample is obviously a great advantage. The sulpho-perchloric digestion technique of TIKHOMIROVA (*Agrokhimiya*, 1970, no. 3: 130-132) has been used successfully.

Sulphur

The present tendency of using cheaper nitrogenous fertilizers containing no sulphur has stimulated an interest in the sulphur status of sugar cane leaves. A very convenient method has been proposed by TABATABAI and BREMNER (*Agron. J.*, **62:** (1970): 805-806); 30 determinations can be made in one day.

Chlorine

This element has rarely been determined on local canes as no sufficiently simple and reliable method was available. Also, the maritime climate of Mauritius with rains carrying much chloride may pose problems with regard to the quality of some agricultural products, specially as potassium chloride is used on a very extensive scale.

A new method based on the extraction with formic acid (WATANABE), *Agron. J.* **63:** (1971): 23), followed by colorimetric determination with mercuric thiocyanate as described by Didier de St. Amand (ORSTOM, *Doc. Tech.* no. 9, 1968) will enable such analyses to be carried out.

Reference leaf samples provided by ORSTOM, *Paris*

A collection of leaf samples grouping 14 different plant species has been analysed concurrently by 14 specialised laboratories. It is a very useful way of checking the accuracy of existing analytical procedures.

Comparative leaf nutrient levels of different varieties

Since the early days of the development of foliar diagnosis the necessity of adjusting differences in leaf nutrient levels due to variety to a permanent "standard" variety (mean of all varieties), which reflects sugar cane in general, has been recognised. The adjustment for the leaf level obtained in each Permanent Sampling Unit is calculated from the following equation :

$$\text{Adjusted value} = \text{Observed value} \times \text{variety correction} \times \text{age correction}$$

The variety correction has previously been calculated from Final Variety Trials and is equal to the ratio : $\frac{\text{Mean leaf levels of all varieties}}{\text{Mean leaf levels of the particular variety}}$ whereas the age correction is the same for all varieties.

The effect of ammonium sulphate applications on leaf nutrient levels

Ammonium sulphate is the most common nitrogenous fertilizer used. Apart from the obvious increases in nitrogen and sulphur, the levels of other leaf nutrients are also affected. Potassium, calcium, manganese and chloride levels are increased whereas there is a decrease in silica and ash levels.

Increases in Ca and Cl uptake due to ammonium sulphate application have not been recorded before. While the increase in Cl content was appreciable, increases in leaf Mn and Mn/SiO_2 ratios were most spectacular for soils rich in MnO_2 through the rise in soil acidity brought about by repeated applications of ammonium sulphate.

Major nutrient exports in millable canes of variety S 17

Available data on major nutrient exports per crop of millable canes refer to the obsolete variety M 134/32. The advent of the new variety S 17, which is now being planted on an extensive scale calls for a re-evaluation of the amount of major nutrients exported from the field per crop. The results are expressed in Table 4 for three levels of nitrogen applied.

Table 4. Stalk composition

	N			P_2O_5			K_2O		
Treatment of N(kg/hectare)	0	70	140	0	70	140	0	70	140
Highest (kg/tonne millable cane)	0.58	0.60	0.99	0.76	0.62	0.41	3.42	3.43	2.83
Lowest (kg/tonne millable cane)	0.19	0.35	0.43	0.21	0.16	0.14	0.85	0.84	0.91
Mean of 12 sites	0.36	0.44	0.62	0.51	0.37	0.28	1.54	1.66	1.57
Mean cane yield (tonnes/hectare)	59	80	85	59	80	85	59	80	85
Mean nutrient exports (kg/hectare or	21	35	53	30	30	23	90	132	133
(kg/arpent)	9	15	22	13	13	10	38	56	56
N recovery (kg/hectare)	—	14	32						
% recovery	—	20	23						

Mean export of major nutrients amounts to about 0.50 kg N: 0.35 kg P_2O_5 and 1.60 kg K_2O per ton of millable cane harvested, giving a ratio of about 1.0 : 0.7 : 3.2. An interesting observation is the low efficiency of N applied (20%).

BIOCHEMISTRY

The rôle of silicon in sugar cane nutrition

Studies on the physiological rôle of silicon in sugar cane were continued.

Yield responses of varieties M 147/44 and M 93/48 growing in pure nutrient solution to Si applied as silicic acid having previously been obtained, these experiments were repeated with two other varieties : S 17 and M 351/57.

Sugar production in detached leaf strips, as well as the area and thickness of third and fourth leaves and chlorophyll content were always higher in Si-rich plants, though not to a significant degree. Cane yield and sucrose content of variety S 17 at harvest were also increased but not significantly by Si treatment. Third leaf analysis showed that Ca and P uptake increased with Si content, Ca showing a very high correlation with SiO_2 ($r = 0.95$). The harvest results obtained for the variety M 351/57 have not been considered, owing to other problems.

Si-deficiency in sugar cane invariably produces, in all varieties so far studied, a reddish-brown 'freckle-like' pigment on the leaves, starting from the older ones. Such deficiency symptoms can only be the result of abnormal physiological conditions. One way of defining these conditions is to characterise the pigment. Most pigments being polyphenolic in nature, leaves of different rank from Si-deficient and Si-rich plants were assayed for their polyphenol content. Si-deficient leaves contained more polyphenols than Si-rich ones, whatever the rank. Also, while polyphenol content increased with leaf age in Si-rich plants, that of Si-deficient ones was fairly constant. Pigments were extracted in methanol, chlorophyll was removed and the resulting extract was separated by paper-chromatography. Twelve spots could be detected under U.V. and ammonia vapour; five of them gave a U.V. spectrum, three of which having peaks at 245 nm, one at 240 nm, and the other at 268 nm. The two key enzymes of phenolic metabolism in *Gramineae*, i.e. phenyl alanine ammonia lyase and tyrosine ammonia lyase are now under study.

Previous investigations having shown that phosphorylation is enhanced *in vivo* by Si, a preliminary study is under way to find out whether the effect could be due to an inhibition of acid phosphatase. Such an inhibition has been reported *in vitro* in rice and potato.

PESTS

THE SCALE INSECT

Biological control of the scale insect (*Aulacaspis tegalensis*)

The breeding and liberation of *Physcus seminotus* Silv. (Aphelinidae), begun in 1969 after its importation from Uganda, was discontinued in October following conclusive evidence that it had become well established in the field. Recoveries of the parasite were made in May-August at Mont Choisy, Pte. aux Sables, Chebel, Argy and Bénarès. In some of these localities the last release had been made 12 months or more previously and the colonies had survived the post-crop period December 1970 - February 1971 when hosts, as usual after harvest, were scarce. Further, the ease with which the parasite could be found and its abundance at, or near, liberation sites left little doubt that it will soon become widespread in areas where the scale insect occurs. It was also remarked that the parasite was abundant in months when parasitism by the local parasite of the scale insect, *Adelencyrtus miyarai*, is at a low level. Field observations made so far therefore indicate that *P. seminotus* will become a common, and possibly the dominant, parasite of the scale insect. Its peculiar biology — only females develop on the scale insect, the males developing hyperparasitically on associated hymenoptera, including individuals of its own kind — will result in a modified interaction of natural enemies that will be of considerable interest.

Breeding and release of a second species of *Physcus*, *P. subflavus* Ann. & Ins., introduced from Tanzania in November 1970, continued throughout the year. Preliminary attempts to recover it at liberation sites were not successful, and there is some reason to believe that this species will prove less adaptable to local conditions than *P. seminotus*. More time, however, must be allowed to elapse before the result of this introduction can be ascertained.

A detailed account of the biology of both *P. seminotus* and *P. subflavus* was completed and submitted for publication in the *Bulletin of Entomological Research*.

The Chief Entomologist, accompanied by Dr. D.J. Greathead of the Commonwealth Institute of Biological Control, went to Réunion Island in June and spent a week collecting the Coccinellid *Sticholotis madagassa* Wse., which is a common predator of the sugar cane scale insect in that island whereas it is not in Mauritius (*Rep. Maurit. Sug. Ind. Res. Inst.* **18**, 1970 : 113). The possibility of different biological strains existing in the two islands made an introduction of Réunion specimens a desirable experiment. About 10,000 beetles were collected by this joint expedition, half of them being released in Mauritius and the others taken by Dr. Greathead for release in East Africa.

In addition to the parasites of *A. tegalensis* that have already been recorded in Mauritius (WILLIAMS, 1970), an ectoparasitic species of *Aphytis*, resembling *A. chrysomphali* Mercet, was discovered at Bénarès, where it was fairly common in May. It could not be found elsewhere and is probably an occasional parasite of limited value.

Weather and incidence of scale insect

A number of factors apart from natural enemies influence abundance of the scale insect (WILLIAMS, 1970). Weather acts directly and indirectly, but any attempt to correlate weather data with abundance of the insect is compromised by the absence of an objective criterion to measure the latter. The years 1970 and 1971 were, however, obviously contrasting with regard to scale insect, its incidence being expectionally low in the former while severe infestations were widespread in the latter. Fig. 10 shows the monthly variations from average rainfall for the two crop years for the island as a

whole. During November-March 1970, rainfall exceeded average in December, January and March bringing the excess for the whole period to + 34.64 cm (14.82″), while rainfall deficits totalling — 42.98cm (16.92″) occurred in November-March 1971, February being the only month not showing a deficit. The impression that dry weather favours scale insect has been held for some time, while distribution of the insect in Mauritius is more or less confined to the lower rainfall areas. The incidence of the insect in 1970-71 is considered to indicate that the gradual build-up of populations that occurs inconspicuously during early growth of the annual crop is retarded by comparatively wet weather and enhanced by comparatively dry weather, the critical months being December-March, inclusive. It is suggested that direct mortality of crawlers by wet conditions is one, and perhaps not the least, of the ways in which weather acts on the insect's abundance.

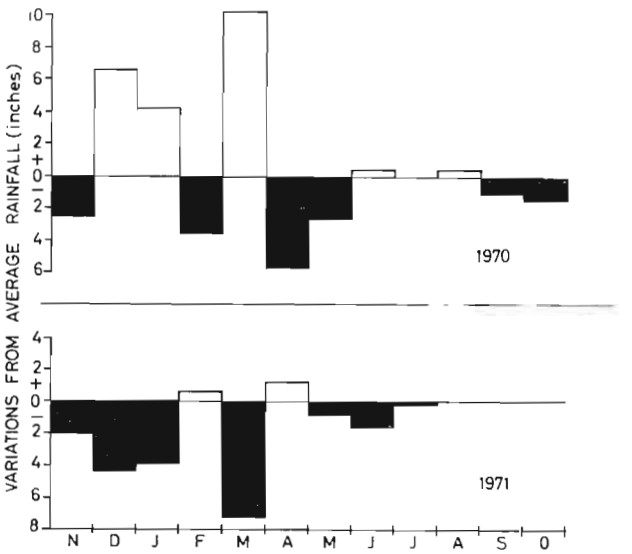


Fig. 10. Rainfall surpluses and deficits in 1970 and 1971

Susceptibility of variety S 17 to scale insect

Different varieties differ markedly in their resistance to scale insect, the varietal character primarily responsible being the extent to which dry leaf sheaths adhere to and envelop the stem. Intensive multiplication of the insect on stems can occur only beneath the protection afforded by leaf sheaths and so-called free-trashing varieties, where the sheath, as it dries, tends to separate from the stem and form an angle with it, e.g. M 13/56, are the least liable to intense infestation. The dry leaf sheaths of S 17, although easily removable, remain as a fairly complete cover over the stems, often enveloping them from top to bottom irrespective of stage of growth. Ideal conditions for the insect are thus provided and stems with virtually 100% of their surfaces infested are not uncommon in this variety, fields of which were frequently infested during the year. On the other hand, the variety does not appear to be particularly intolerant, in the sense that serious, irreversible deterioration of cane quality is not inevitable after appreciable stem infestation (as it is with N Co 376). However, it seems well for growers to realise that an increase of scale insect is liable to result in lower altitudes as the area planted to S 17 is extended.

The spotted cane borer (*Chilo sacchariphagus*) **in variety S 17**

Experience with S 17 to-date indicates that it tends to suffer more from the spotted borer than other varieties in cultivation. A very high percentage of stems are often bored but data that would demonstrate a tendency for borer populations to be high in this variety are difficult to obtain. One aspect of borer attack in S 17 is, however, worthy of comment. The variety is particularly liable to produce side-shoots and adventitious roots at the tops of stalks when under water stress. These symptoms have been confused with borer attack, which often results in side-shooting but not in the production of adventitious roots. Borer attack can coincide with these effects of drought with devastating effect, killing stalks and giving an impression of borer susceptibility that is not justified.

Mythimna tincta **(Wlk.) on sugar cane**

Mythimna tincta (Noctuidae), formerly known as *Leucania dialeuca*, was found on cane at Henrietta in January. Larvae were feeding on the foliage, particularly the spindle leaves, of young ratoon shoots but causing no damage of consequence. This is the first time the insect has been recorded on sugar cane since 1912.

MISCELLANEOUS

Three television talks were made, one on pests of sugar cane and the other on pests of groundnuts and potatoes.

The Chief Entomologist was appointed official correspondant to the Commonwealth Institutes of Entomology and Biological Control. He was also appointed representative of the Chamber of Agriculture on the Pesticides Control Board and a representative of the *Société de Technologie Agricole et Sucrière de Maurice* on the *Conseil d'Administration* of *La Revue Agricole et Sucrière de l'Ile Maurice*.

Overleaf : Sugar cane root disease (*Fusarium*)

DISEASES

The work of the Division of Plant Pathology has three main objectives which are interrelated :

(i) controlling diseases through advisory services, field inspections, quarantine and other routine procedures ;

(ii) testing disease reaction of new varieties of cane and, more recently, of food crops;*

(iii) research and experimentation to promote (i) and (ii).

ADVISORY WORK

Three TV talks were given on the gumming disease problem by the Chief Pathologist who also collaborated with the Extension Service of the Ministry of Agriculture and Natural Resources for two more talks, specially prepared for small planters, on the eradication of cane varieties susceptible to gumming disease.

DISEASE SITUATION IN 1971

Dry conditions during the earlier part of 1971 considerably reduced the dissemination of gumming disease. Consequently, very little striping was observed even on the most highly susceptible varieties, except in one locality, on dark magnesium clay soil, which has constituted the most important focus of the disease in the past four years.

On the other hand, the dry spell which started since the end of 1970 has been responsible for a marked effect of leaf scald in the northern sector where variety M 13/56, formerly rated highly resistant, has again been found infected in a number of fields but without damaging effect. A few dead stalks have been observed, however, on one estate in variety S 17, known to be moderately susceptible. Such effect could be attributed to the disease under conditions of serious drought.

The smut problem, reported on an estate of the western sector in 1970, has fortunately not deteriorated. The disease has not been detected on other estates, but has been observed in two varieties in advanced stages of selection.

The year was marked by the record of a new virus disease resembling streak on a foreign variety in a multiplication plot.

Disease control

Gumming (Xanthomonas vasculorum)

Climatic conditions having restricted the spread of the disease in M 377/56, whose cultivation had to be stopped as a result of the breakdown of its resistance in 1971, the problem in this variety has however not deteriorated. Very few cases of systemic infection were observed, but it is believed that a number of stools in fields previously heavily infected, still harbour the pathogen in the latent systemic phase, and will serve as infection foci when conditions favourable to dissemination once more set in.

* The latter being dealt with in another section of this report.

Even foliar infection in the variety was restricted to the previously affected fields, or to those established from them prior to the discovery of the 1971 outbreak. On the other hand, a great number of fields of the variety are believed to be still free from systemic infection, the phase of the disease most important for its perpetuation in M 377/56.

The extension of the variety has been brought virtually to a standstill. The ban on its cultivation cannot be repealed as long as there are a number of old infected M 147/44 fields, which constitute the main source of infection in the island. The future of M 377/56, (as well as that of other varieties) depends on the rapid eradication of these main sources of infection as well as on the ban on the extension of that variety in order to prevent the perpetuation of the epidemic.

Very little, if any, of the condemned varieties, B 3337 and B 34104, are at present under cultivation. With the co-operation from all sectors, it is hoped that the eradication of M 147/44 will have been completed by December 1973.

Ratoon stunting (virus)

Four hundred tons of cuttings were treated in the M.S.I.R.I. tank at Réduit to establish about 40 hectares of regional A-nurseries on estates and 2 hectares at the Central Cane Nursery. About 425 hectares of B-nurseries were planted on estates. The proportion of commercial plantations established with RSD-free setts is steadily increasing.

Quarantine and export of varieties

Twenty-seven varieties imported from the following countries have been released from the quarantine greenhouse : Australia (3), Barbados (3), Cuba (3), Hawaii (1), India (1), Philippines (2), Réunion (4), South Africa (1), Taïwan (3), and United States – mainland – (6). One variety in the consignment from Barbados failed to germinate.

Mauritian varieties were distributed to the following countries : Burma (2), South Africa (6), Spain (1), Taïwan (2) and Zambia (2).

Disease-resistance testing

As it has become essential to increase the volume and scope of disease-testing procedures, while maintaining the correct balance between the three sectors of activities already mentioned, an experimental officer was appointed whose duties are devoted to disease-resistance testing.

One innovation was the establishment of a disease observation plot in the sub-humid region, mainly for assessment of reaction to smut and rust. This plot is the counterpart of the one established in the super-humid zone for yellow spot and chlorotic streak rating. The systematic inspection of variety trials has also been improved by including an additional post-harvest round for observations on young ratoon shoots.

Gumming

Four resistance trials were conducted but have been seriously handicapped by dry conditions resulting in erratic growth and extremely low infection level. The percentage of varieties showing resistance ranged from 91 to 100; the results in these trials cannot therefore be relied upon. The policy of testing one stage earlier in the selection line was implemented for the first time; out of 1798 varieties properly established in this new first-stage testing, only 72 (2.9% of the total included) will be discarded for susceptibility, all others being carried forward.

Ratoon stunting

Difficulties are experienced in the conduct of RSD trials. Although good results are obtained when comparing progeny from heat-treated cane with that from untreated, comparison of inoculated v/s non-inoculated on identical material derived from treated stock, gives erratic results. Thus, although some spectacular effects of inoculation were obtained in the present trial in virgin, results in 1st and 2nd ratoons have been irregular. Inoculation, although with pressure-cup, does not appear to give the striking effects of the disease observed in other countries. Adverse climatic conditions, drought mainly, may no doubt be the determining factors inducing such effects, but one is tempted to think that the local strain of the virus is a comparatively mild one.

Investigations

Chlorotic streak

A substantial decrease in yield in third ratoon due to organic amendments (scums & molasses), as opposed to inorganic fertilizers, was registered in the experiment where chlorotic streak infection in M 442/51 had been found favoured by the organic amendments since earlier ratoons.

In another experiment on cultural practices to reduce infection, a slightly lower infection level was observed on ridge as opposed to furrow planting in untreated plots of M 351/57. Infection in treated plots is yet too low to detect differences in rate of re-infection between the two methods of planting.

Gumming

Thirteen out of 264 stools established with gamma-irradiated M 377/56 cuttings have shown visible mutations, mainly variegation of the rind.

About a thousand individual stools derived from single-eye cuttings selected at random from the above progeny, irrespective of appearance of mutations, are now being tested for their reaction to gumming disease.

Leaf scald (*Xanthomonas albilineans*)

In a trial, established to test the resistance of a number of varieties of world wide origin, an excellent level of infection has been observed in 1st ratoon, ranging from an average of 35% in the most susceptible down to 2% in the most resistant. A number of varieties have behaved according to their world wide rating but in various others, reaction is not in agreement with their behaviour elsewhere. Comparison of results obtained in similar tests which are being carried out in other countries may throw some light on strain variation of the pathogen in different territories.

Short hot-water treatment

Four trials were conducted on four varieties to test the desirability of extending the short hot-water treatment to the northern sector of the island, and a slight yield increase was obtained in one trial only. It appears from the results that, in this area, where in fact chlorotic streak is not really a problem, the beneficial effect observed in germination and early establishment, has little repercussion on final yield. It is therefore far more important to plant under optimum conditions to ensure proper establishment than to use the short hot-water treatment.

Suspected streak virus infection

Symptoms strongly suggestive of streak were observed in the recently introduced Hawaiian variety H 53-263 in a multiplication plot, prior to entry in variety trials. Owing to certain leaf and stalk abnormalities, not described for streak, the possibility that a strain of mosaic could be involved was also suspected. As both diseases are not known to exist in Mauritius, and owing to the severe nature of the infection causing pronounced stunting in infected stools, investigations were promptly undertaken in an attempt to elucidate the problem.

Inoculations into several grass hosts, healthy plants of the same variety as well as other varieties, failed to transmit the disease, thus excluding mosaic infection. The collaboration of Mr. P. Baudin, Virologist, *Ecole Nationale Supérieure Agronomique, Université de Tananarive*, was obtained for virus purification, serological diagnosis and electron microscopy. Serological tests with the Madagascar mosaic strain antiserum, as well as with five Louisiana mosaic strains antisera (kindly supplied by Dr. A.S. Gillaspie, Virologist, USDA, Sugar Cane Field Station, Houma, Louisiana) confirmed the absence of mosaic.

Electron microscopy of leaf sections has revealed the presence of a spherical virus. This and similarity of symptoms with those of infected material collected long ago from Réunion Island suggest streak disease. On account of certain very important leaf and stalk symptoms, the identity with sugar cane streak described elsewhere may be questioned.

The absence of the disease in original plots of the variety still standing, excludes its accidental introduction through quarantine in 1964. A local source of the virus, presumably in natural grass hosts, is more probable. Recent transmission in stools newly planted from healthy cuttings of the same variety in the same location indicates the presence of an active transmission agent. It should be recalled that maize streak is sporadically observed in Mauritius whenever susceptible varieties are planted, and that cane streak has been recorded in the past in a plot of variety RP8 but was subsequently completely eradicated.

The diseased plot of H 53-263 has been thoroughly uprooted and burnt. A careful survey has not revealed any spread of the disease to other varieties in the same multiplication plot. Further work on transmission is being pursued in an insect-proof greenhouse.

Yellow spot (*Cercospora kœpkei*)

With the removal of the most highly susceptible variety, B 3337, from cultivation, yellow spot is not an immediate problem in the super-humid zone, but a correct appreciation of the effect of this disease on yield is a pre-requisite for future orientation with regard to its control, especially concerning the varietal resistance selection policy.

Spraying trials with the systemic fungicide Benlate (Benomyl) have been modified in order to obtain yield loss assessment on cane harvested in early, medium and late season. Under the conditions which prevailed during the year, spraying at three weeks interval in B 3337, throughout the infection period, gave an average of 65% control (11.9% v/s 34.4% infection). It appears from the data obtained on cane yield and sucrose content that the disease affects the latter in cane harvested early, i.e. just after infection subsides, while for mid- and late-season harvest it is cane yield which is affected (fig. 11).

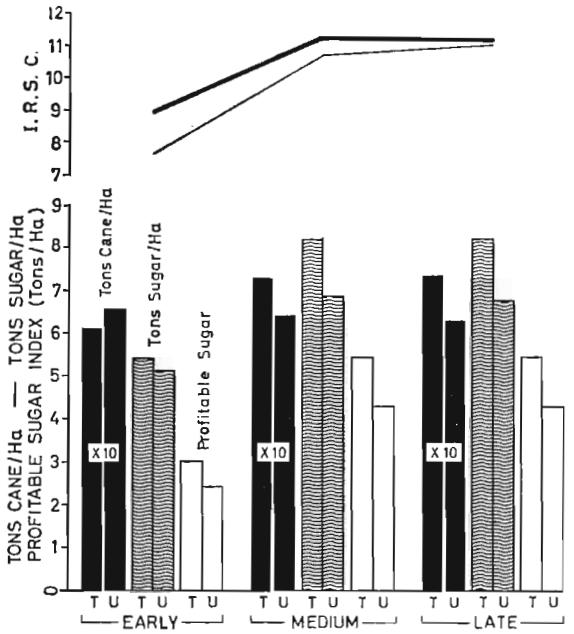


Fig. 11. Effect of benlate sprays on IRSC, Tonnes cane/ha, Tonnes sugar/ha and profitable sugar index in variety B 3337 infected with yellow spot. Bold line = treated ; Thin line = untreated.

Spraying resulted in an increase of sugar/hectare of 7.9%, 19.3% and 21.9% respectively. Increase in profitable sugar index was virtually the same for all dates of harvest and averaged 23.8%. Correcting for experimental error, a net increase of 7% was obtained by spraying treatments.

The evolution of the disease is being correlated every year to meteorological data.

MISCELLANEOUS

The Chief Pathologist was appointed official correspondent to the Commonwealth Mycological Institute. He paid a visit to the University of Madagascar in June in relation to the new virus disease recorded on sugar cane in Mauritius.

WEED
AGRONOMY

Screening of new herbicides with the Chesterford logarithmic spraying machine

Overleaf: Post-emergence weed control in plant cane

WEED AGRONOMY

LOGARITHMIC TRIAL WITH NEW HERBICIDES

Five herbicides, namely VENZAR, HOE 2991, MON 097, VCS 438 and R 7465 were compared to DCMU in the super-humid zone using the Chesterford logarithmic spraying machine. Their chemical composition is given below :

Chemical composition of herbicides

DCMU	:	N - (3,4-Dichlorophenyl) NN' dimethyl Urea
VENZAR	:	3 – cyclo hexyl – 5,6 – trimethylene Uracil
HOE 2991	:	3 – tetra fluoroethoxyphenyl N, N-dimethyl Urea
MON 097	:	2 – chloro – N – (ethoxymethyl) – 6' – ethyl – 0 – acetotoluidide
VCS 438	:	2 – (3,4 – Dichlorophenyl) – 4 – methyl –1, 2, 4 – oxadiazolidine — 3,5 —dione
R 7465	:	2 – (α – Naphtoxy) – *N, N* – diethyl proprionamide

The main weed species encountered were *Ageratum conyzoides, Apium leptophyllum, Cyperus rotundus, Kyllinga monocephala, Nothoscordum inodorum, Oxalis debilis, O. latifolia, O. repens, Plantago lanceolata, Sonchus asper* and *Youngia japonica.* Fifteen minor species were also recorded.

All the chemicals, except R 7465 were comparable to DCMU up to 2 months after spraying. The latter proved to be the best chemical at time of survey. Of the new herbicides, VENZAR gave the best control but HOE 2991, MON 097 and VCS 438 did show good herbicidal properties while R 7465 was less effective (Table 5).

Data recorded show that the chemicals did not affect germination and growth of cane variety M 93/48. Rainfall recorded was 889 mm (35.0 inches)

Table 5. Weed assessment data 113 days after spraying

(Frequency-abundance method, expressed as % of control)

	DOSAGE RATES OF HERBICIDES (kg a.i. per hectare)				
HERBICIDES	*5.38 - 4.09 (5.00 - 3.80)**	*4.09 - 3.06 (3.80 - 2.85)*	*3.06 - 2.31 (2.85 - 2.15)*	*2.31 - 1.77 (2.15 - 1.65)*	*1.77 - 1.34 (1.65 - 1.25)*
DCMU	18.6	19.5	22.9	30.5	34.7
VENZAR	23.7	29.7	28.0	39.0	44.9
HOE 2991	31.4	39.0	43.2	46.6	42.4
MON 097	39.0	39.0	39.8	42.4	50.8
VCS 438	39.8	36.4	39.0	49.2	48.3
R 7465	50.8	45.8	47.5	61.0	58.5

* Figures in brackets represent lb a.i. per arpent

HERBICIDES V/S HAND-WEEDING — FINAL RESULTS

These experiments have been described in last year's Annual Report. The results published for "long season" plant cane showed that it was much more profitable to weed cane fields first by chemical sprays followed by other sprays or handweedings rather than by manual labour only.

Costing : Chemical weeding v/s handweeding

The cost of weed control comparing herbicide treatments combined with handweeding (when necessary) with manual weeding only for "long season" and "short season" plant canes and for ratoons is given in Tables 6, 7 and 8 respectively. The figures for "short season" plant canes and for ratoons confirm those obtained last year for "long season" plant canes.

Table 6. Plant Canes ("long season")

HAND-WEEDING ONLY *HERBICIDES + HAND-WEEDING (when necessary)*

LOCALITY	*No. of hand-weedings*	*Total cost per ha* Rs. cs.	*Number of spra-yings & cost*	Rs. cs.	*Number of hand-weedings & cost*	Rs. cs.	*Total cost per ha* Rs. cs.	*Difference between cost of handweeding & chemical weeding* Rs. cs.
Mon Rocher (SH)	3	340.66 (143.74)*	3	156.66 (66.10)	—		156.66 (66.10)	184.00 (77.64)
Mon Choisy (SH)	4	1,011.35 (426.73)	4	208.80 (88.10)	—		208.80 (88.10)	802.55 (338.63)
Beau Vallon (SH)	4	308.10 (130.00)	1	52.38 (22.10)	3	181.31 (76.50)	233.60 (98.60)	74.50 (31.40)
Beau Songe (SHI)	3	238.90 (100.80)	1	52.38 (22.10)	1	79.63 (33.60)	132.01 (55.70)	106.89 (45.00)
Clarence (SHI)	4	360.24 (152.00)	2	150.73 (63.60)	1	52.14 (22.00)	202.87 (85.60)	157.37 (66.40)
Deep River (H)	3	605.84 (255.63)	3	276.56 (116.69)	1	160.92 (67.90)	437.72 (184.59)	168.12 (71.04)
Bel Ombre (H)	3	417.12 (176.00)	1	175.85 (74.20)	1	51.19 (21.60)	227.05 (95.80)	190.07 (80.20)
Sans Souci (SPH)	5	1,198.56 (505.72)	2	225.62 (95.20)	1	75.84 (32.00)	301.46 (127.20)	897.10 (378.52)
Cent Gaulettes (SPH)	4	415.20 (175.19)	2	225.62 (95.20)	1	33.18 (14.00)	258.80 (109.20)	156.40 (65.99)

* Figures in brackets represent costs per arpent.

SH = Sub-humid

SHI = Sub-humid irrigated

H = Humid

SPH = Super-humid

Table 7. Plant Canes ("short season")

HAND-WEEDING ONLY *HERBICIDES + HAND-WEEDING (when necessary)*

LOCALITY	*No of hand-weed-ings*	*Total cost* Rs. cs.	*Number of sprayings & cost* Rs. cs.	*Number of handweedings & cost* Rs. cs.	*Total Cost* Rs. cs.	*Difference between cost of handweeding & chemical weeding* Rs. cs.
Belle Mare (SH)	4	246.48 (104.00)	2 100.94 (42.59)	1 37.92 (16.00)	138.86 (58.59)	107.62 (45.41)
Mon Trésor-M. Désert (SHI)	4	296.25 (125.00)	1 52.38 (22.10)	2 144.57 (61.00)	196.95 (83.10)	99.30 (41.90)
St. Antoine (SHI)	4	247.67 (104.50)	3 149.50 (63.08)	—	149.50 (63.08)	98.17 (41.42)
Trois Ilots (H)	4	392.21 (165.49)	4 318.01 (134.18)	—	318.01 (134.18)	74.20 (31.31)
Rich Fund (H)	4	450.21 (189.96)	2 223.25 (94.20)	1 63.87 (26.95)	287.13 (121.15)	163.08 (68.81)
Riv. de Créoles (SPH)	5	537.94 (226.98)	2 235.10 (99.20)	1 97.93 (41.32)	333.03 (140.52)	204.91 (86.46)
Unité (SPH)	5	890.53 (375.75)	2 225.62 (95.20)	2 222.19 (93.75)	447.81 (188.95)	442.72 (186.80)
Alma Lenferna (SPH)	4	798.67 (336.99)	2 270.65 (114.20)	1 202.04 (85.25)	472.70 (199.45)	325.97 (137.54)

Table 8. Ratoon Canes

HAND-WEEDING ONLY *HERBICIDES + HAND-WEEDING (when necessary)*

LOCALITY	*No of hand-weed-ings*	*Total cost per ha.* Rs. cs.	*Number of sprayings & cost* Rs. cs.	*Number of handweedings & cost* Rs. cs.	*Total Cost per ha.* Rs. cs.	*Difference between cost of handweeding & chemical weeding* Rs. cs.
Beau Vallon (SH)	2	137.46 (58.00)	1 34.84 (14.70)	1 61.62 (26.00)	96.46 (40.70)	41.00 (17.30)
Sauveterre (SH)	2	90.06 (38.00)	1 34.84 (14.70)	—	34.84 (14.70)	55.22 (23.30)
Beau Plan (SHI)	1	63.99 (27.00)	1 34.84 (14.70)	—	34.84 (14.70)	29.15 (12.30)
St. Antoine (SHI)	4	255.96 (108.00)	3 98.02 (41.36)	—	98.02 (41.36)	157.94 (66.64)
Colmar (H)	2	199.08 (84.00)	1 117.32 (49.50)	—	117.32 (49.50)	81.76 (34.50)
Highlands (H)	3	279.66 (118.00)	1 117.32 (49.50)	1 37.92 (16.00)	155.24 (65.50)	124.42 (52.50)
Gonard (H)	2	181.31 (76.50)	1 115.66 (48.80)	—	115.66 (48.80)	65.65 (27.70)
Olivia (H)	3	295.40 (124.64)	2 148.91 (62.83)	—	148.91 (62.83)	146.49 (61.81)
Trois Ilots (H)	3	271.13 (114.40)	3 180.50 (76.16)	—	180.50 (76.16)	90.63 (38.24)
Diagonal (SPH)	3	272.55 (115.00)	1 115.66 (48.80)	1 71.67 (30.24)	187.32 (79.04)	85.23 (35.96)
St. Julien (SPH)	3	398.02 (167.94)	1 115.66 (48.80)	1 95.99 (40.50)	211.64 (89.30)	186.38 (78.64)
Valetta (SPH)	3	285.16 (120.32)	1 115.66 (48.80)	2 89.63 (37.82)	205.29 (86.62)	79.87 (33.70)

Assessment of herbicidal treatment on growth

Measurements of dewlap height in "short season" plant canes revealed that cane growth was better in chemically treated plots, and in four trials at Rich Fund, Rivière des Créoles, Unité and Alma Lenferna, the difference was significant (Table 9), thereby confirming results obtained last year in "long season" plant canes.

Two experiments were abandoned owing to very poor germination, and no data are available for the trial at Mon Trésor-Mon Désert.

Table 9. Mean dewlap height per plot % control
(3 months after planting)

LOCALITY	*Herbicide † treatment*	*Hand-weeding*
Belle Mare	232	227
St. Antoine	119	103
Trois Ilots	113	116
Rich Fund	193**	164
Rivière des Créoles	238**	136
Unité	170*	151
Alma Lenferna	154**	105

† The herbicide treatment is the general herbicidal practice for the particular region.

* Significant at 5% level

** Significant at 1% level

Effect of herbicidal treatment and handweeding on yield

In "long season" plant canes in five trials there was an increase in yield in favour of the herbicide treatment. At Clarence the yield in the handweeded plot was better. This is due probably to the fact that a post-emergence application done 12 weeks after planting caused a leaf burn of young canes of variety M 377/56.

In "short season" plant canes the yield was definitely in favour of the herbicide treatment, except at Rich Fund and Unité where the yields in the treated and handweeded plots were nearly equal.

In ratoons, five out of ten experiments gave higher yields in the treated plots.

Two experiments in the first series at Beau Vallon and Beau Songe, and two in the third, one at Trois Ilots and Sauveterre were accidentally harvested by growers.

The results are given in Table 10.

Table 10. Cane and sugar yield per hectare

(*a*) *"LONG SEASON" PLANT CANES*

LOCALITY	*Tonnes of cane/hectare*		*Tonnes of sugar/hectare*	
	Herbicide	*Handweeding*	*Herbicide*	*Handweeding*
Mon Rocher	56.9(24.0)†	51.9(21.9)	6.00(2.53)	5.47(2.31)
Mon Choisy	41.7(17.6)**	34.1(14.4)	3.74(1.58)	3.06(1.29)
Clarence	138.6(58.5)	140.8(59.4)	14.89(6.28)	15.12(6.38)
Deep River	102.9(43.4)	97.4(41.4)	10.74(4.53)	10.17(4.29)
Bel Ombre	83.4(35.2)	78.9(33.3)	9.05(3.82)	8.56(3.61)
Sans Souci	100.5(42.4)	101.2(42.7)	8.27(3.49)	8.34(3.52)
Cent Gaulettes	81.8(34.5)	75.8(32.0)	8.54(3.60)	7.92(3.34)

(*b*). *"SHORT SEASON" PLANT CANES*

LOCALITY	*Tonnes of cane/hectare*		*Tonnes of sugar/hectare*	
	Herbicide	*Handweeding*	*Herbicide*	*Handweeding*
Belle Mare	70.9(29.9)†	64.0(27.0)	7.09(2.99)	6.40(2.70)
Mon Trésor-Mon Désert	91.5(38.6)*	78.0(32.9)	11.44(4.83)	9.75(4.11)
Saint-Antoine	98.8(41.7)*	85.6(36.1)	12.02(5.07)	10.40(4.39)
Trois Ilots	71.8(30.3)	67.1(28.3)	8.70(3.67)	8.13(3.43)
Rich Fund	101.7(42.9)	101.2(42.7)	12.32(5.20)	12.28(5.18)
Rivière des Créoles	93.9(39.6)*	79.2(33.4)	10.64(4.49)	8.98(3.79)
Unité	88.6(37.4)	88.4(37.3)	10.43(4.40)	10.40(4.39)
Alma Lenferna	75.4(31.8)**	61.4(25.9)	6.75(2.85)	5.50(2.32)

(*c*). *RATOONS*

LOCALITY	*Tonnes of cane/hectare*		*Tonnes of sugar/hectare*	
	Herbicide	*Handweeding*	*Herbicide*	*Handweeding*
Beau Vallon	90.8(38.3)†	91.7(38.7)	11.20(4.73)	11.32(4.78)
Beau Plan	80.8(34.1)**	68.0(28.7)	8.61(3.64)	7.25(3.06)
St. Antoine	105.5(44.5)	100.3(42.3)	12.22(5.15)	11.61(4.90)
Colmar	92.7(39.1)	90.5(38.2)	9.94(4.19)	9.70(4.10)
Highlands	66.4(28.0)	65.4(27.6)	5.89(2.48)	5.80(2.45)
Gonard	113.0(47.7)	105.2(44.4)	10.41(4.39)	9.69(4.09)
Olivia	114.5(48.3)	114.5(48.3)	12.31(5.19)	12.30(5.19)
Diagonal	90.1(38.0)	90.1(38.0)	10.65(4.49)	10.65(4.49)
Saint Julien	74.9(31.6)	69.2(29.2)	8.56(3.61)	7.90(3.33)
Valetta	116.1(49.0)	115.2(48.6)	11.82(4.99)	11.73(4.95)

† Figures in brackets represent yields per arpent

* Significant at 5% level

** Significant at 1% level

Profit

An illustration of the gross profit obtained as a result of the increase in sugar production between treated and hand-weeded plots is given in the first column of Table 11. Also, the additional saving made through the application of the chemical treatment as compared to hand-weeding is shown in the second column.

Table 11. Gross Revenue* : Herbicides v/s Handweeding

(*a*). *"LONG SEASON" PLANT CANES*

LOCALITY	*Amount Rs.*	*Rs.*
Mon Rocher	271.13(114.40)**	184.00(77.64)
Mon Choisy	357.16(150.70)	802.55(338.63)
Deep River	294.83(124.40)	168.12(71.04)
Bel Ombre	258.80(109.20)	190.07(80.20)
Cent Gaulettes	320.42(135.20)	156.40(65.99)

(*b*). *"SHORT SEASON" PLANT CANES*

Belle Mare	357.40(150.80)	107.62(45.41)
Mon Trésor-Mon Désert	887.33(374.40)	99.30(41.90)
St. Antoine	838.03(353.60)	98.17(41.42)
Trois Ilots	295.78(124.80)	74.20(31.31)
Rivière des Créoles	862.68(364.00)	204.91(86.46)
Alma Lenferna	654.12(276.00)	325.97(137.54)

(*c*). *RATOONS*

Locality	*Amount Rs.*	*Rs.*
Beau Plan	714.79(301.60)	29.15(12.30)
St. Antoine	308.10(130.00)	157.94(66.64)
Colmar	109.02(46.00)	81.76(34.50)
Gonard	369.72(156.00)	65.65(27.70)
St. Julien	345.07(145.60)	186.38(78.64)

* Calculated at Rs. 520 per ton sugar

** Figures in brackets represent revenue per arpent.

Conclusion

The difference between sugar yields and cost of weeding operations prove beyond doubt that chemical weeding in sugar cane fields, not only, on the whole, increases sugar production per unit area but also reduces cost of production.

PRE-EMERGENCE TRIALS WITH NEW HERBICIDES

Small-plot technique

Six experiments were laid down in the humid and super-humid zones in plant canes.

(i) *Humid zone*

The trials were carried out at Mon Trésor (Mon Trésor-Mon Désert S.E.), Helvetia (Mon Désert-Alma S.E.) and Trois Ilots (Beau Champ S.E.) and were planted with variety S 17. Sixteen herbicidal treatments were compared to Atrazine at 4.30 kg a.i./ha (4.0 lb a.i./arp.) as shown in Table 12. None of the treatments affected germination and cane growth.

Table 12. Results of herbicide treatments on weeds

HUMID ZONE

HERBICIDES	*Dosage kg a.i./ha*	*Frequency abundance % Control*	
		*Mon Tresor**	*Helvetia***
Atrazine	4.30	33.3	19.1
R.P. 17623	4.30	21.9	17.7
R.P. 17623	3.23	27.6	20.7
G.S. 14254 + Atrazine	(1.61 + 1.61)	35.9	—
G.S. 14254 + G.S. 14259	(1.61 + 1.61)	42.6	33.7
G.S. 14254 + G.S. 14259	(2.15 + 2.15)	44.8	32.1
G.S. 14254	4.30	42.6	31.7
G.S. 14259	4.30	42.4	28.5
A 3589	3.23	44.3	29.7
A 3589	4.30	44.3	26.5
A 3798	3.23	48.3	33.3
A 3798	4.30	45.9	30.3
A 3783	3.23	52.9	33.0
A 3783	4.30	53.8	32.1
A 3799	3.23	52.9	35.9
A 3799	4.30	44.3	31.7
BAS 2900	4.30	62.1	53.3
VCS 438	4.30	—	31.7

* 104 days after spraying, 424 mm (16.68 inches)

** 107 days after spraying

At Mon Trésor the most abundant weed species were *Oxalis spp.*, *Cyperus rotundus*, *Bothriospermum tenellum*, *Mimosa pudica*, *Solanum nigrum*, *Siegesbeckia orientalis*, *Phyllantus tenellus*, *Youngia japonica*, *Sonchus asper*, *Setaria barbata*, *S. pallide-fusca*. Nineteen other species were also recorded. R.P. 17623 at 3.23 kg a.i./ha (3.0 lb a.i./arp) and 4.30 kg a.i./ha (4.0 lb a.i./arp) gave better control than Atrazine while the mixture G.S. 14254 + Atrazine (1.61 + 1.61) kg a.i./ha (1.5 + 1.5) lb a.i./arp) gave comparable results.

At Helvetia, where the field was irrigated again R.P. 17623 at 4.30 kg a.i./ha (4.0 lb a.i./arp) was found to be superior to Atrazine and the 3.23 kg a.i./ha (3.0 lb a.i./arp) treatment was equally good. The main weed species were *Oxalis spp*, *Cyperus rotundus*, *Ageratum conyzoides*, *Digitaria timorensis*, *Bidens pilosa*, *Sonchus asper*, *Phyllantus tenellus*, *Amarantus caudatus*, *Solanum nigrum* and nineteen minor ones.

No survey was carried out at Trois Ilots as the field was remarkably clean even in control plots 120 days after spraying. As the field had been under groundnuts before the trial was laid down, it may have undergone a special preparation.

(ii) *Super-humid zone*

Three experiments were laid down at Le Val, New Grove (Rose-Belle S.E.) and Beau Bois (Mon Désert-Alma S.E.). Thirteen herbicidal treatments were compared to DCMU at 4.30 kg a.i./ha (4.0 lb a.i./arp). Again, as in the humid zone, no ill-effect was noted on the crop. At Le Val and Beau Bois the fields were planted with variety M 93/48 and at New Grove with M 202/46.

Table 13. Results of herbicide treatments on weeds
SUPER-HUMID ZONE

HERBICIDES	*Dosage (kg a.i./ha)*	*Frequency Abundance % Control*		
		*Le Val**	*Beau Bois***	*New Grove****
DCMU	4.30	26.7	35.3	36.1
R.P. 17623	4.30	16.4	19.4	38.9
R.P. 17623 + DCMU	(1.61 + 1.61)	24.9	31.3	42.6
R.P. 17623 + DCMU	(2.15 + 2.15)	20.9	26.0	39.8
G.S. 14254	3.23	42.9	44.5	57.2
G.S. 14254	4.30	37.0	37.4	55.4
G.S. 13529	4.30	36.0	39.6	44.8
Atrazine	4.30	37.5	37.2	48.3
G.S. 14254 + G.S. 14259	(1.61 + 1.61)	46.0	49.2	52.2
G.S. 14254 + G.S. 14259	(2.15 + 2.15)	38.8	39.2	52.4
A 3589	3.23	42.2	48.1	54.5
A 3589	4.30	41.7	47.0	48.0
A 3590	3.23	43.4	42.3	46.0
A 3590	4.30	37.8	44.7	48.3

* 101 days after spraying, 708 mm (27.8 inches)
** 125 days after spraying, 620 mm (24.4 inches)
*** 103 days after spraying, 799 mm (31.44 inches)

The dominant weed species at Le Val were *Oxalis debilis*, *Colocasia antiquorum*, *Cynodon dactylon*, *Oxalis repens*, *Digitaria horizontalis*, *Kyllinga polyphylla*, *Phyllantus tenellus*, *Solanum nigrum*, *Paspalum paniculatum*, *Bothriospermum tenellum*, and seventeen less abundant ones. R.P. 17623 at 4.30 kg a.i./ha (4.0 lb a.i./arp) proved to be the best treatment. The mixtures R.P. 17623 + DCMU at (2.15 + 2.15) kg a.i./ha (2.00 + 2.00) lb a.i./arp) gave better results than DCMU at 4.30 kg a.i./ha (4.0 lb a.i./arp).

The weed spectrum at Beau Bois consisted mainly of *Oxalis spp*, *Sonchus asper*, *Cyperus rotundus*, *Bothriospermum tenellum*, *Nothoscordum inodorum*, *Digitaria timorensis*, *Kyllinga monocephala Youngia japonica*, *Sisyrinchium chilense*. Twenty three minor species were also recorded. Owing to the dense Oxalis population, R.P. 17623 gave the best weed control. At 4.30 kg a.i./ha (4.0 lb a.i./arp) it proved superior to the standard treatment while, two combinations with DCMU at 2.15 kg a.i./ha (2.0 lb a.i./arp) and 1.61 kg a.i./ha (1.5 lb a.i./arp) compared favourably to DCMU itself at 4.30 kg a.i./ha (4.0 lb a.i./arp).

At New Grove, the standard treatment gave the best control, followed by R.P. 17623 at 4.30 kg a.i./ha (4.0 lb a.i./arp) which was slightly inferior. The weed species were more or less the same as at Beau Bois except that *Ageratum conyzoides* was more abundant (Table 13).

Large scale trials

Humid zone

The herbicidal treatments were G.S. 14254 at 3.23 and 4.30 kg a.i./ha (3.0 & 4.0 lb a.i./arp), R.P. 17623 at 3.23 and 4.30 kg a.i./ha (3.0 & 4.0 lb a.i./arp) and Atrazine at 4.30 kg a.i./ha (4.0 lb a.i./Arp). At Mon Trésor and Helvetia R.P. 17623 gave the best control, increasing with dosage rate. Atrazine was superior to G.S. 14254 at both dosage rates.

Conclusion

Results obtained this year confirm again the excellent herbicidal properties of R.P. 17623 and its effectiveness in the humid and super-humid zones. The new triazine compounds G.S. 14254 and G.S. 14259 which gave promising results in 1969 and 1970 were less effective this year. Owing to the high cost of R.P. 17623 it is improbable that it can be used on a large scale. Atrazine and DCMU remain the standard residual herbicides in the humid and super-humid zones respectively.

SPECIAL WEED PROBLEM

Cynodon dactylon

One trial was laid down in an abandoned field at Minissy (Mon Désert-Alma S.E.). The weed was cut short and was sprayed 4 weeks later. To achieve thorough wetting, a fairly high volume of water 1125 litres/ha (450 litres/arp) was used. The results of three surveys are given in Table 14.

At the conclusion of the experiment, the mixture TCA + Dalapon 21.5 + 53.8 kg a.i./ha (20.0 + 50.0 lb a.i./arp) and TCA + Sodium Chlorate 107.5 + 107.5 kg a.i./ha (100 + 100 lb a.i./arp) proved to be the best treatments. However, the former is to be preferred as it was slightly more effective and is more economical. These mixtures can be applied in non-crop land between two rotations, but it is strongly recommended that at least six months should elapse before the field is planted in sugar cane.

Table 14. Herbicide treatments on *Cynodon dactylon*

	Treatment	*Dosage kg a.i./ha*	*% kill* 14.5.71	*% kill* 3.8.71	*% regrowth* 13.9.71
1.	TCA + Sodium Chlorate*	107.5 + 107.5 (100.0 + 100.0)**	92.5	100.0	5.0
2.	DCMU + TCA + Sodium Chlorate*	12.9 + 53.8 + 53.8 (12 + 50 + 50)	85.0	85.0	20.0
3.	Hyvar X + Sodium Chlorate*	4.30 + 53.8 (4.0 + 50.0)	55.0	30.0	70.0
4.	Hyvar X + Sodium Chlorate*	6.45 + 53.8 (6.0 + 50.0)	70.0	60.0	55.0
5.	Hyvar X + Gramoxone	4.30 + 1.08 (4.0 + 1.0)	80.0	60.0	60.0
6.	Hyvar X + Gramoxone	6.45 + 1.08 (6.0 + 1.0)	80.0	65.0	45.0
7.	Dalapon + TCA*	21.5 + 53.8 (20.0 + 50.0)	85.0	100.0	*few spots*
8.	A 3789 + Sodium Chlorate*	6.45 + 53.8 (6.0 + 50.0)	65.0	35.0	75.0
9.	DCMU + Dalapon*	12.9 + 108. (12.0 + 10.0)	60.0	70.0	65.0
10.	DCMU + Gramoxone	12.9 + 1.08 (12.0 + 1.0)	70.0	20.0	85.0

* 1 litre surfactant added

** Figures in bracket represent lb a.i./Arp.

MISCELLANEOUS

One TV talk on Weed Control was given by the Weed Agronomist in March 1971.

The Weed Agronomist left for U.K. on study leave in October 1971.

PHYSIOLOGY

Overleaf: Spraying of sugar cane ripener Mon 045

PHYSIOLOGY

Physiology of flowering

Studies conducted in recent years have led to the practical control of flowering in a number of clones. Thus, last year, flowering was delayed in several *S. spontaneum* clones and a number of interesting crosses were effected.

Several *S. officinarum* clones fail to flower because development of the floral primordium is slow or does not take place; experiments were therefore laid down to study the effect of photoperiod on this process. Preliminary results have shown that short photoperiods (9-11 hour) applied during post-initiation stages failed to promote floral differentiation in *S. officinarum* var. Beau Bois; on the other hand, the same treatment was successful with *S. spontaneum* clones. This points to major differences in the mechanisms controlling flowering in these two species. Consequently, basic research on the factors which could influence floral development in *S. officinarum* will be pursued.

Physiology of growth

An analysis of yield (sugar per unit area) into its various components is the pre-requisite for understanding varietal differences. There are two aspects to the problem :

(i) Yield differences in a given variety when it is grown in different environments.

(ii) Yield differences between different varieties when they are grown in the same environment.

Basic crop physiological studies were therefore started on four varieties grown in two contrasting environments. An attempt was made to explain yield differences by following the rates of tillering and elongation as well as the development of the leaf area. Some interesting preliminary results have been obtained, and it seems that they will have an important bearing on agronomic and selection practices.

Ripening of sugar cane

Maturity trials

Four preliminary experiments were conducted to investigate the effect of variety, age of crop, time of harvest and climate on sugar content and sugar yield in varieties M 13/56, M 93/48, M 377/56 and S 17. Preliminary results have shown that the time of harvest was the most important factor influencing sugar content; age of crop had little effect (fig. 12). The main effects of age of crop and date of harvest on fresh weight yield were complex, as they included effects of age of crop, time of harvest and season during growth which itself was related to planting date. Further analysis of the data has shown that differences in fresh weight yield are mainly accounted for by planting date (fig. 13). The resultant effects on sugar yield are shown in fig. 14.

A number of interactions were significant and have stressed the complexity of the problem. Consequently, studies on a larger scale have started and twenty maturity trials were laid down last year. The main objectives of these trials are :

(i) to study the effects of plant age, climate and season on maturity behaviour;

(ii) to investigate available field sampling methods for maturity determination;

(iii) to study the physiological basis of differences in yield between varieties planted in different environments;

(iv) to investigate the effect of plant age and time of harvest on ratooning behaviour of varieties grown in different environments.

Methods of assessing maturity

Five trials were conducted in collaboration with Estate Agronomists to compare the various methods of assessing maturity on a field scale basis. The following methods were compared: moisture content of spindle and 8th to 10th internodes; refractometric brix readings (field method) taken at three points along the stalk, from the data various ratios were computed; the refractometric brix of the top, middle and bottom sections were also determined at the laboratory, and finally the reducing sugars pol ratio was calculated. The results appear to indicate that the evolution in time of the mildpoint brix (field method) (fig. 15) and of laboratory brix mid-section are satisfactory methods of folo-wing the ripening process in a given field. It must, however, be emphasized that before final recommendations can be made, the accuracy of these methods for different varieties grown in the various climatic zones and soil types must be determined.

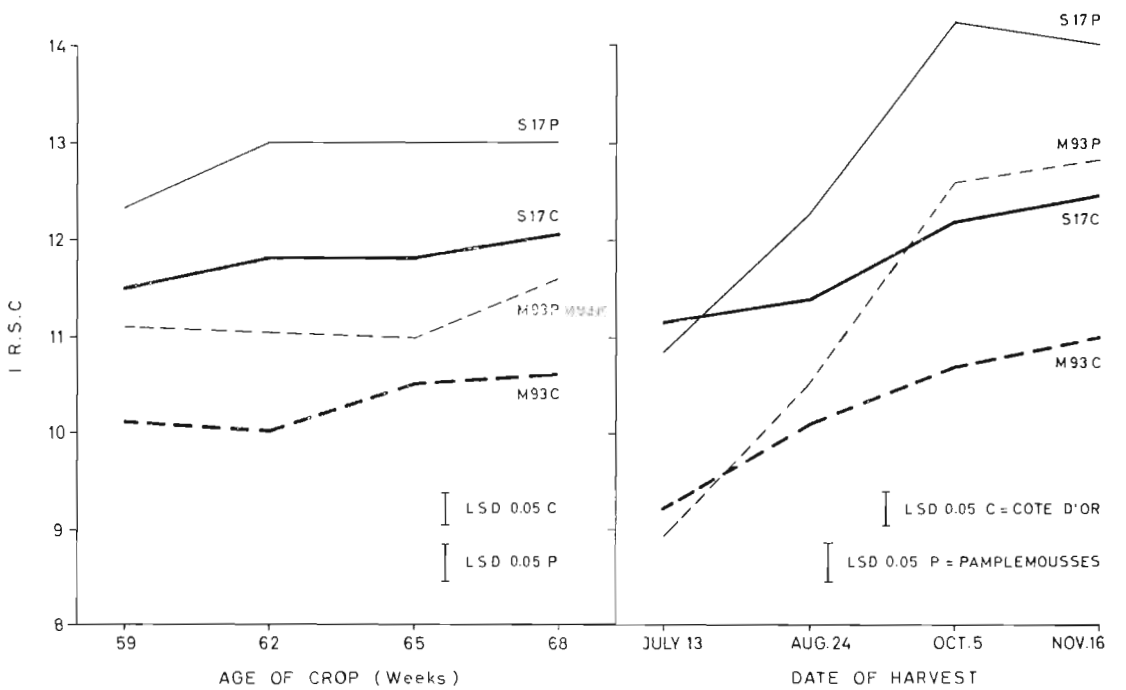


Fig. 12. Main effects of age of crop and date of harvest on IRSC in varieties S 17 and M 93/48. (grown in two contrasting environments).

Sugar cane ripener (CP 41845)

Variety M 442/51

Four experiments were conducted on this variety, two early in the season (July) and two late (September). The treatments were in a 4 x 3 factorial structure and included 4 rates (0, 2.15, 4.30, 6.45 kg a.i./ha) and 3 dates of harvest (3, 6 and 9 weeks after application). The results obtained are outlined below.

Although fresh weight yield was variable, a significant increasing trend with increase in age of crop was evident; furthermore, the chemical did not depress yield even at the highest dosage. IRSC increased with age; however, the response to the chemical was low and generally very variable. This confirms earlier results which showed that poor varieties do not respond well to the chemical. The time of the season at which the application was made did not seem to influence the response.

It may therefore be concluded that this chemical cannot be used as a ripener on this variety.

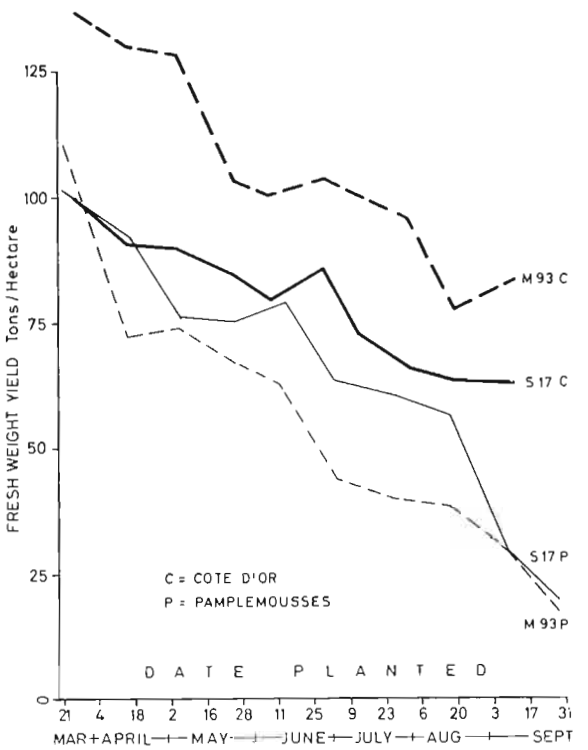


Fig. 13. Effect of planting date on fresh weight yield in varieties S 17 and M 93/48. (grown in two contrasting environments).

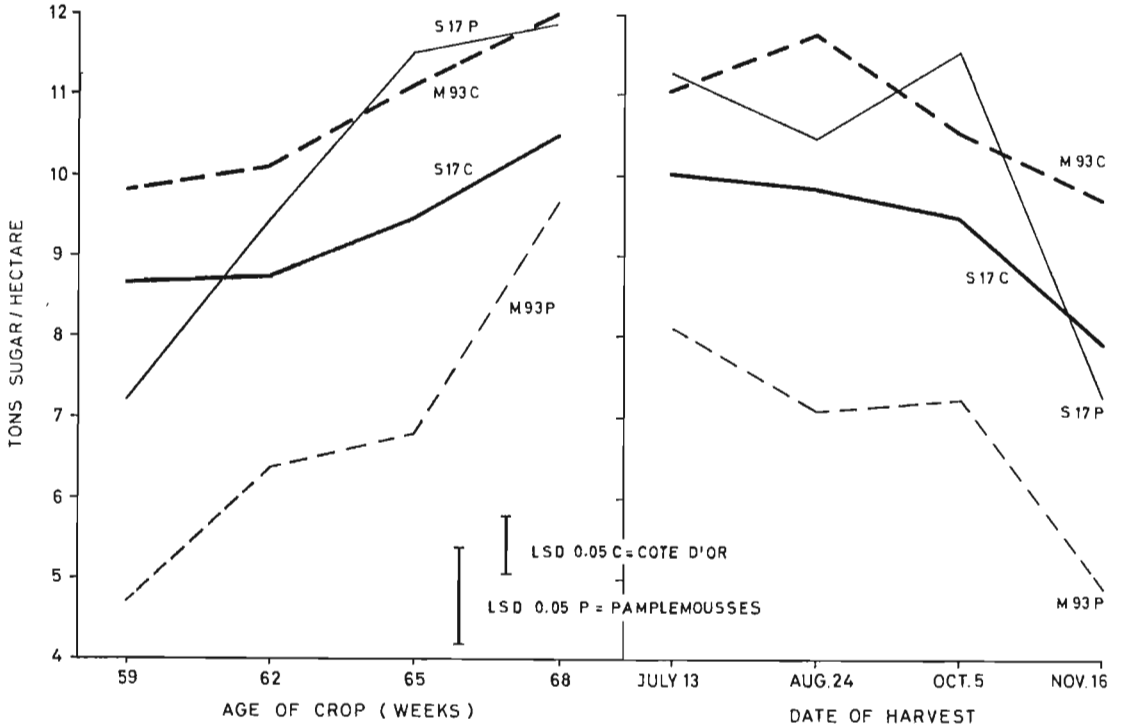


Fig 14. Effect of age of crop and date of harvest on sugar yield in varieties S 17 and M 93/48. (grown in two contrasting environments).

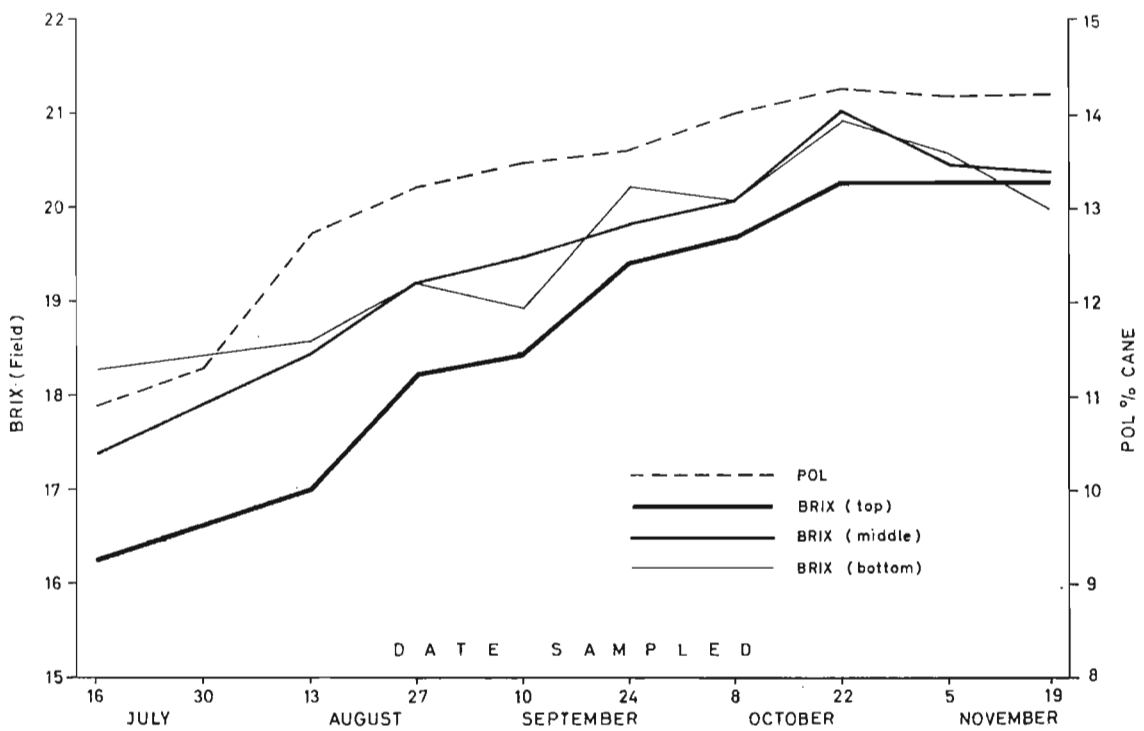


Fig. 15. Evolution of refractometric Brix (field method) compared to Pol % cane in variety M. 351/57 [taken at points 1/6 (bottom), 1/2 (middle), and 5/6 (top) along the stalk].

Variety M 13/56

Two experiments were conducted on this variety, one early (June) in the season and the other late (September). Experimental design was as for M 442/51.

Fresh weight was again highly variable and once more no reduction in yield due to treatment could be detected. In both experiments, there were highly significant increases of IRSC at all rates (fig. 16). In both experiments maximum response was obtained when harvest was conducted 9 weeks after application, while at 3 weeks after application, response was low particularly in the late experiment. The optimum rate was 6.45 kg a.i./ha in the early experiment and 4.3 kg a.i./ha in the late experiment; good response was obtained at 2.15 kg a.i./ha.

Variety S. 17

Two experiments were conducted on this variety; in both, application was made early (July) in the season. The design was again as for variety M 442/51. The pattern of response was similar in both experiments. The optimum rate was about 4.3 kg a.i./ha. Maximum response was obtained six weeks after application; the chemical lost some of its effects after 9 weeks. This may be contrasted with the results obtained with M 13/56 when maximum response was obtained after 9 weeks.

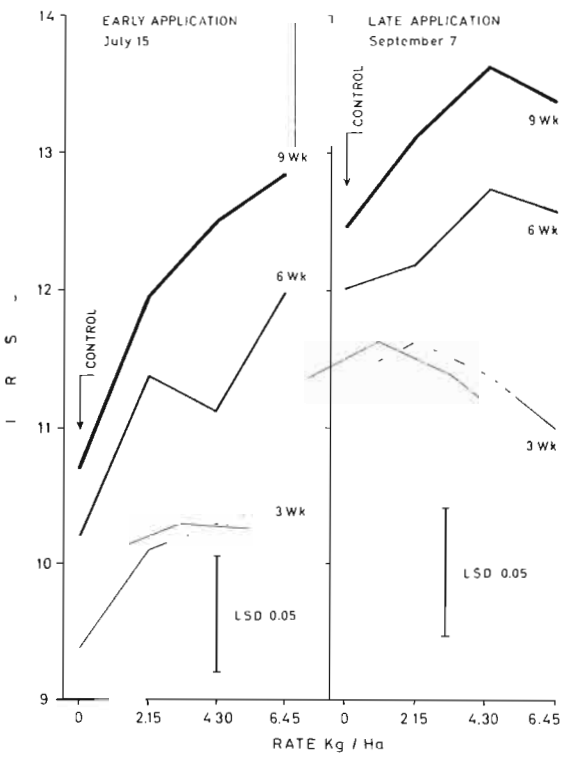


Fig. 16. Effect of ripener CP. 41845 on IRSC in variety M 13/56, harvested 3, 6 and 9 weeks after application.

General

The results obtained with varieties S 17 and M 13/56 are very promising; however, before recommendation for commercial use can be made, the effect of the chemical on ratooning ability has to be investigated. Furthermore, physiological effects of the chemical not hitherto reported are being investigated.

IRRIGATION

Overleaf.· Distribution patterns of new equipment being tested in the field :
Boom-O'-Rain (modified), *top*
Targetmaster (model 750), *bottom*

IRRIGATION

Survey

A new survey of irrigated cane lands was made in December 1970 to complement those made in 1965 and in 1963. The figures obtained show a constant progress in favour of overhead irrigation and of total extent of irrigated lands, while surface irrigation is gradually losing favour. This observation is supported by the following figures :

Area Irrigated (ha)

	Surface			*Overhead*			*Total*		
	1963	*1965*	*1970*	*1963*	*1965*	*1970*	*1963*	*1965*	*1970*
Planters	3084	2633	2089	844	949	672	3928	3582	2761
Estates	5413	5249	5390	2840	3840	5123	8253	9089	10513
Total	*8497*	*7882*	*7479*	*3684*	*4789*	*5795*	*12181*	*12671*	*13274*

Advice on Estates

Four detailed economic studies were made for sugar estates and one for large planters. Two of these projects have been implemented and the others are being considered.

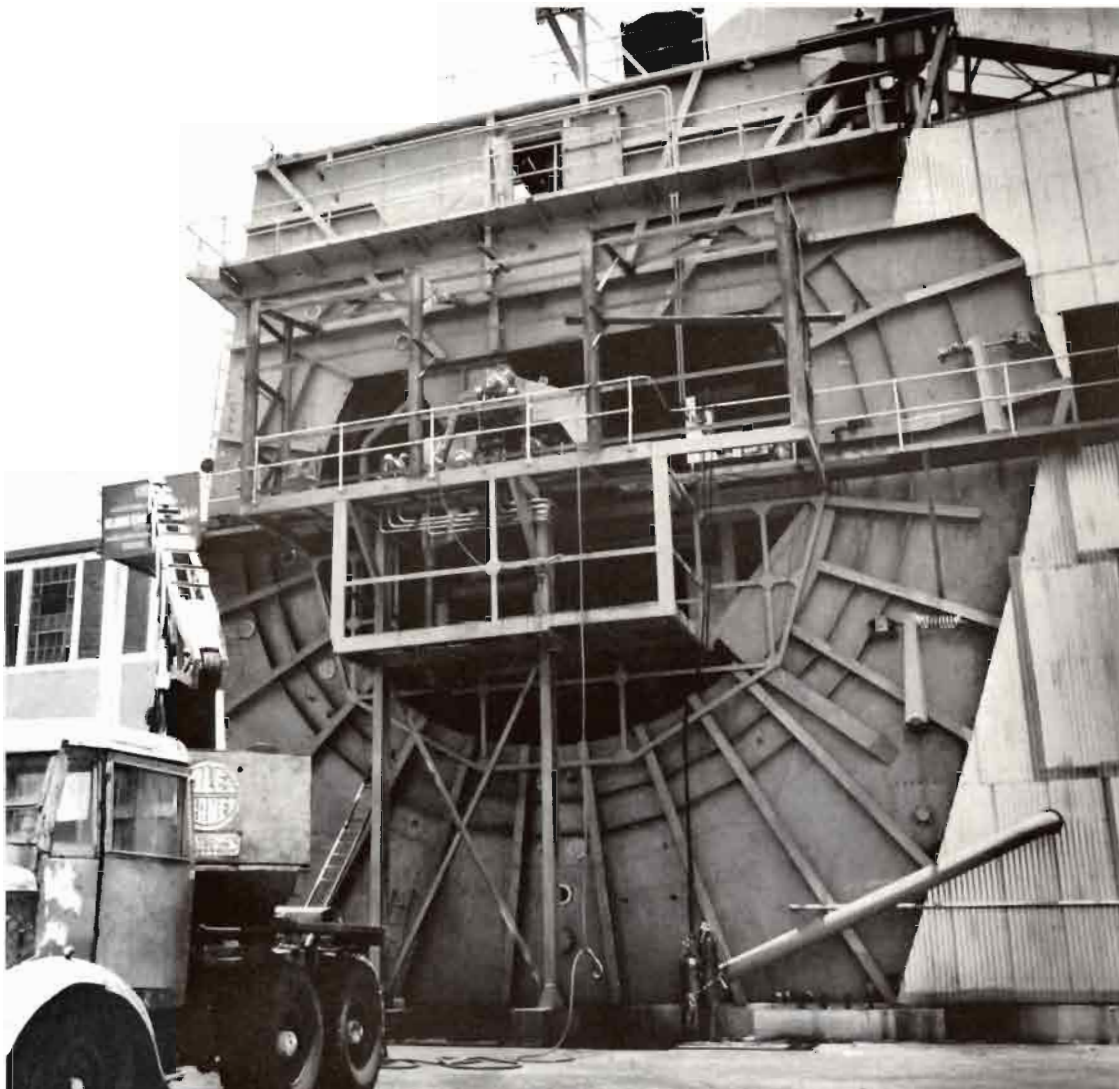
From these it appears that wherever possible a fixed irrigation equipment is to be preferred to a semi-portable one. The capital outlay is higher, but in the long run the savings on spare parts, replacement of portable line and labour, will more than compensate the initial cost. Some figures are quoted below :

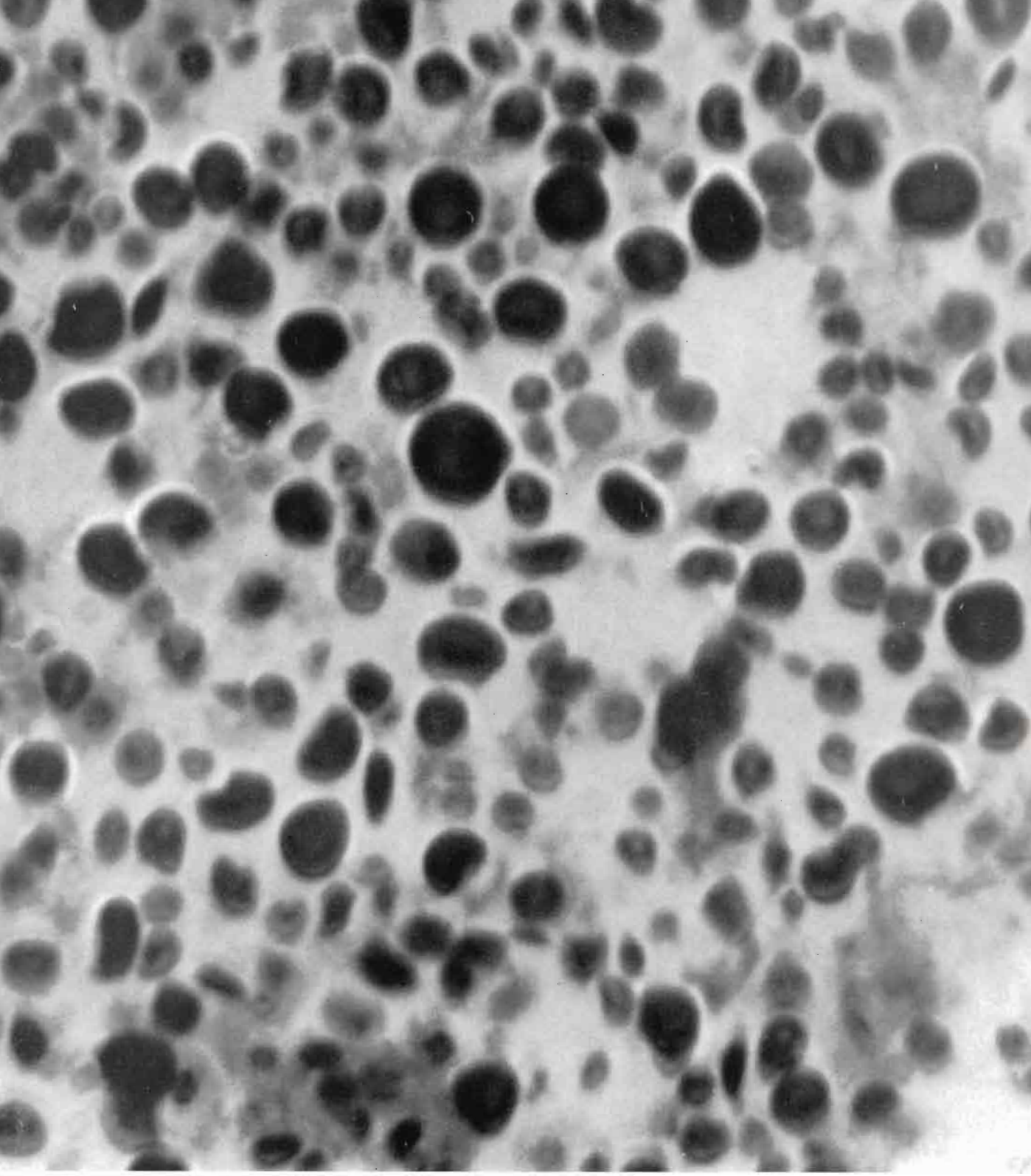
	Capital expenditure	*Running cost*	*Depreciation*
Fixed equipment	Rs. 4,029/ha.	Rs. 5.75/ha/mn	Rs. 1.75/ha/mn
Semi-portable equipment	Rs. 2,607/ha.	Rs. 7.—/ha/mn	Rs. 2.01/ha/mn

Moreover, in gravelly soils when small irrigation doses applied frequently are to be preferred to large doses applied at longer intervals, only a fixed installation will enable work to be carried out normally, as very short irrigation cycles cannot be effectively applied by a semi-portable system.

Routine work concerning testing of new or modified sprinklers was carried out as usual; and advice, whenever sought by estates for installation of meteorological observation plots in connecton with irrigation, was given.

SUGAR MANUFACTURE





Cane starch granules stained with iodine (x 500)

Overleaf : Saturne diffuser at St. Antoine S.E.

SUGAR MANUFACTURE

CANE DIFFUSION

Assessment of performance of the Saturne diffuser, St. Antoine Factory

During the 1971 harvesting season much time was devoted to the assessment of performance of the Saturne diffuser installed at St. Antoine factory where it has replaced the 2nd and 3rd units of the previous 5-mill tandem, and to investigations into problems which the change from straight milling to milling-diffusion could be expected to bring about. It has been reported that in South African cane diffusion factories, the fibre content of cane as calculated from weights of cane, mixed juice and water and analysis of final bagasse is significantly higher than true fibre and this is attributed to loss of water by evaporation enhanced by the high temperatures obtaining in the diffusion plant. Since fibre content of cane, as reported by factories in their chemical control bulletin, is utilized in the calculation of the share of sugar accruing to planters from the processing of their cane, this aspect of the problem was also investigated.

In the absence of suitable equipment to weigh the bagasse it was decided to compare fibre content of cane determined by direct analysis with the corresponding figure arrived at by the inferential method normally used. This was carried out during several four-hour tests with the milling tandem prior to commissioning of the diffuser. It was intended to repeat the same tests with the diffuser, but this could not be done because of the considerable practical difficulties involved.

Results of the fibre tests with the mills are shown in Table 15 and indicate that fibre % cane by direct determination was in all cases but one, higher than the corresponding value obtained inferentially.

Table 15. Comparison between fibre content of cane by direct determination and by inferential method

F % cane by direct determination	16.03	14.80	15.09	16.77	16.30	15.80
F % cane by inferential method	13.48	14.80	14.98	13.31	13.23	12.99
Difference	2.55	Nil	0.11	3.46	3.07	2.81

Apart from sampling and analytical errors, this could be due to the unweighed amounts of journal bearings' cooling water which could be observed to gain access to the juice circuit.

It became evident then that the diffuser performance, if assessed by the official factory control methods, could not be envisaged with confidence because of the doubts regarding the fibre figures.

It was decided therefore to assess pol extraction with the milling tandem proper from direct analysis of cane and bagasse and to use the same procedure for milling-diffusion. Results of these tests are shown in Tables 16 and 17.

Table 16. Pol extractions with milling tandem proper

	POL EXTRACTED % POL IN CANE					
Test No.	*1st Mill*	*2nd & 3rd mills combined*	*4th & 5th mills combined*	*Overall*	*Reduced to 12.5% fibre*	*Imbibition % Fibre*
1	59.8	25.4	7.3	92.5	94.4	191
2	67.2	20.1	6.2	93.5	94.7	186
3	64.8	22.4	6.3	93.5	94.8	190
4	54.9	29.7	8.2	92.8	94.7	180
5	67.2	20.9	5.3	93.4	95.2	208
6	65.1	23.3	5.7	94.1	95.5	195
7	64.1	22.3	7.7	94.1	95.5	179
8	61.8	25.1	6.9	93.8	95.6	—
Mean	*63.2*	*23.6*	*6.7*	*93.5*	*95.1*	*190*

Table 17. Pol extractions with milling-diffusion plant

	POL EXTRACTED % POL IN CANE					
Test No.	*1st Mill*	*Diffuser Extractor*	*Dewatering Mills*	*Overall*	*Reduced to 12.5% fibre*	*Imbibition % Fibre*
1	57.8	22.1	13.2	93.1	95.2	228
2	56.5	20.3	16.4	93.2	95.0	232
3	57.9	23.0	11.9	92.8	95.1	236
4	65.4	21.5	6.7	93.6	95.3	260
5	56.6	26.3	10.2	93.1	95.8	276
6	69.5	5.0	19.2	93.8	95.4	214
7	65.8	14.1	14.0	93.9	95.3	234
8	69.1	6.4	18.0	93.5	95.1	226
9	67.0	15.8	11.1	93.9	95.6	216
Mean	*62.8*	*17.2*	*13.5*	*93.5*	*95.3*	*236*

The average overall mill extractions for mills only and for mills-diffuser were the same, but in the latter case the amount of imbibition water % fibre was 24% higher than in the case of straight milling, suggesting a poorer performance of the mills-diffuser combination as compared with the mills proper. However, with such heterogeneous material as chopped cane and bagasse, errors due to sampling could be large enough to mask the true picture and allowance for this must be made when considering the figures given.

It is strongly recommended that scales for weighing final bagasse and diffusion juice be installed prior to next crop, failing which it will not be possible to assess accurately the efficiency of the installation.

Regular checks on the pH of the juice sampled at different points in the diffuser have shown this parameter to be very stable indicating good sanitary conditions throughout the system.

A few tests to find out the effect of particle size on extraction performance have been carried out but insufficient data preclude the drawing of any conclusion on this aspect.

SURVEY OF SATURATION TEMPERATURES OF FINAL MASSECUITES

Using the technique described previously (RIVALLAND, 1970)* a survey of saturation temperatures of final massecuites was undertaken in several factories. Saturation temperatures were determined at striking, at the end of the reheating cycle and after reheating prior to centrifugalling. The data obtained from this survey are summarised in Table 18.

Table 18. Saturation temperatures of final massecuites

			Saturation Temperatures °C		
Factory	*Type of reheater*	*Brix*	*At striking*	*After cooling*	*After reheating*
Mon Désert-Alma	Electric resistance	95.0	71	52	55
Highlands	Hot water coil	95.4	72	55	61
Britannia	Hot water coil	92.1	78	60	64
Beau Champ	Electric resistance	92.8	72	50	53
F.U.E.L.	Hot water coil	—	67	54	55

* Notes on the use of the saturascope for the determination of saturation temperature. *Rep. Maurit. Sug. Ind. Res. Inst.* **18 :** 175-176

The aim in crystallizer work is to bring the saturation temperature of the massecuite down to at least the temperature to which the massecuite is reheated prior to centrifugalling. The latter lies around 45°C under Mauritian conditions, and the saturation temperatures obtaining at the end of the cooling cycle, as shown in Table 18, indicate that crystallizer work was not as good as it should have been.

The increase in saturation temperature due to reheating indicates that some resolution of sucrose took place in all cases surveyed.

SURVEY OF POL IN OPEN CELLS OF PREPARED CANE

Following preliminary investigations in 1970, it was felt that a more thorough study of the efficiency of cane preparation should be made. Accordingly, attention was again paid to the problem in 1971. At the beginning of the crop, factory Chemists were asked to include determinations of pol in open cells in their daily chemical control routine with the aim to gather sufficient results to correlate, if possible, the degree of cane preparation with mill extraction. On account of unforseen difficulties, only nine factories were able to carry out the tests during the greater part of the crop. The data collected are summarised in Table 19. Also included are details of equipment and power installed for cane preparation.

Table 19. Pol in open cells and corresponding mill extractions

Factory	*Knives*	*Shredder*	*Average per cent pol in open cells*	*Average 1st mill extraction*	*Average R.M.E.*	*Rated HP per tonne fibre/hr*
Constance	1 x 24 1 x 32	Gruendler	57.1	67.0	95.5	48.8
Beau Champ	1 x 42 1 x 72	—	44.0	67.2	95.2	30.1
Médine	1 x 40 1 x 100	Gruendler	66.5	66.9	96.3	56.1
St. Antoine*	1 x 36 1 x 44	—	61.2	62.8	95.3	42.4
Riche en Eau	1 x 54 1 x 104	—	56.4	67.9	96.2	50.0
Belle Vue	1 x 68 1 x 72	—	49.2	61.9	96.3	36.8
The Mount	1 x 34 1 x 88	—	48.7	66.9	97.0	54.5
Savannah	1 x 28 1 x 48 1 x 92	—	61.6	—	95.8	51.4
Bel Ombre	1 x 32	Gruendler	54.0	67.1	95.7	47.5

Contrary to Australian experience, there was no correlation between pol in open cells and either first mill extraction or reduced mill extraction for any particular factory. It should be mentioned that great variations were noted in actual pol in open cells figures. This is probably due partly to variations in fibre content of different cane varieties and also to errors in sampling, which seems to be the most difficult part of the operation.

* milling cum diffusion

This survey emphasizes the fact that cane preparation in Mauritius is poor as compared to that obtaining in Australia where average pol in open cells as determined by the same technique utilised during this survey is above 80 (FOSTER & CULLEN, 1970)*. There are indications that the degree of preparation could be improved by taking full benefit of installed power; at St. Antoine factory, the percentage pol in open cells which stood at about 45 at the beginning of the crop immediately jumped to 61 when the direction of rotation of the second set of knives was changed, the knives then turning against the canes.

FINAL MOLASSES

Determination of sucrose in final molasses

The determination of sucrose in molasses by the double-polarization procedure is cumbersome and subject to errors arising from a number of causes, the main ones being the dark colour of the solutions, the use of varying amounts of lead for clarification and the presence of optically-active impurities; hence the need for a rapid accurate method of analysis for factory chemical control has arisen and as a consequence certain countries have abandoned the use of the optical method in favour of the chemical method, using invertase for inversion. However, since it was reported at the last session of I.C.U.M.S.A. that acid inversion gave more reliable results than invertase, it was decided to study the method and compare it with the one using double polarization.

Clarification and inversion were carried out as usual; the inverted solution was then neutralized and total invert determined by Lane & Eynon titration. Preliminary results indicate : (a) the total inversion time of 10 minutes appears to be insufficient for complete hydrolysis; (b) the chemical method is more reliable, the standard deviation being only half that obtained in the case of the optical method; and (c) lower results are obtained with the chemical method, differences increasing with increasing content of reducing sugars.

Work involving the use of glucose oxidase for determination of sucrose in molasses was started. The method involves determination of glucose by glucose oxidase before and after inversion. Efforts were directed at finding optimum conditions for the determination.

Determination of moisture in final molasses by the Karl Fischer method

The Sugar Technology Division has been studying, for several years, the problem of exhaustibility of Mauritius final molasses with the view of curtailing sucrose losses in this end product. In the course of this work it is necessary to determine dry matter in order to calculate true purity. Unless carried out in a special oven, the determination of dry matter is delicate, time-consuming and not very accurate, since during drying it is known that deterioration occurs.

At present, dry matter is calculated from the refractometric Brix according to a regression formula, but individual determination by an accurate method of analysis would be preferable. The Karl Fischer method provides an alternate way of arriving at dry matter. The method is quick but more expensive than other methods and it demands more skill and care with the reagents. Due to lack of suitable information about reproducibility and accuracy of the K.F. moisture determination in molasses from raw cane sugar factories, it was decided to investigate the method, and a fully automatic Metrohm KF Titrator E 452 was purchased by the Division.

Many practical difficulties were encountered but finally overcome. Work, to develop a reproducible technique, is continuing on the method.

* Private Communication

The reproducibility of determinations of Brix of final molasses

Investigations in view of assessing the magnitude of various components of variance involved in the determination of Brix of final molasses, namely those due to (a) equipment utilised in the course of the analysis; (b) sampling procedure adopted; and (c) general methodology were started.

In the first phase of this work the same equipment was utilised for Brix determinations for various subsamples of a given molasses by several analysts.

A statistical analysis of the data obtained so far has revealed that the variance for the various subsamples was very small as compared to that for the different analysts.

Further experiments involving analysis of various samples by several analysts using different equipment are being carried out.

The exhaustibility of final molasses

Work started in 1970 on this project was continued in 1971. The original method of exhausting the molasses by seeding in temperature controlled crystallizers after concentration until a viscosity of 600 poises @ 50°C had been reached was abandoned because it was too time consuming. The new technique involves forced crystallization in a laboratory vacuum pan, the aim being to bring the saturation temperature of the molasses as near to 50°C as possible and then complete the exhaustion in a crystallizer, the viscosity of the mother liquor being the same as in the previous technique. Progress in this project was seriously handicapped by erratic operation of the vacuum pump fitted to the pan. The vacuum pan was eventually transferred to Highlands Sugar Factory and connected to the vacuum system there. A liquid ring vacuum pump has been ordered and work on this project will be resumed when this equipment is received.

CANE STARCH

Cane starch compared to other natural starches for use as standard in starch determination

When evaluating starch in raw sugars by colorimetric techniques, the standard curve is generally obtained from a reference substance other than cane starch, as the latter is difficult to obtain in adequate quantity in the pure form. However, since cane starch does not necessarily contain the same amylose-amylopectin ratio as other natural starches, it was decided to isolate it and compare it with other starches. Consequently, a sample of starch was recovered from juice of cane variety M 147/44, purified and used together with the more common starches for drawing the standard curves shown in fig. 17. Optical densities were read at 580 nm on a Lumetron Colorimeter.

In addition, the amylose content of the various starches was determined by the colorimetric technique described by Mc Cready and also by the potentiometric technique described by Bates. Purity was determined by acid hydrolysis followed by Lane & Eynon's method for reducing sugars. The data obtained are collated in Table 20 and show that in the case of Potato and Lintner's starches, the difference in amylose content as determined by the two techniques is large.

In the course of these investigations it has been noticed that difficulties sometimes arise during the preparation of a starch solution for the drawing up of a standard curve.

Only Lintner's starch gave an absolutely clear solution, all the others were opalescent. Consequently, the use of Lintner's starch for the preparation of standard curves is recommended.

It must be borne in mind, however, that since many variable factors are involved in the analytical method, starch values obtained are only approximate.

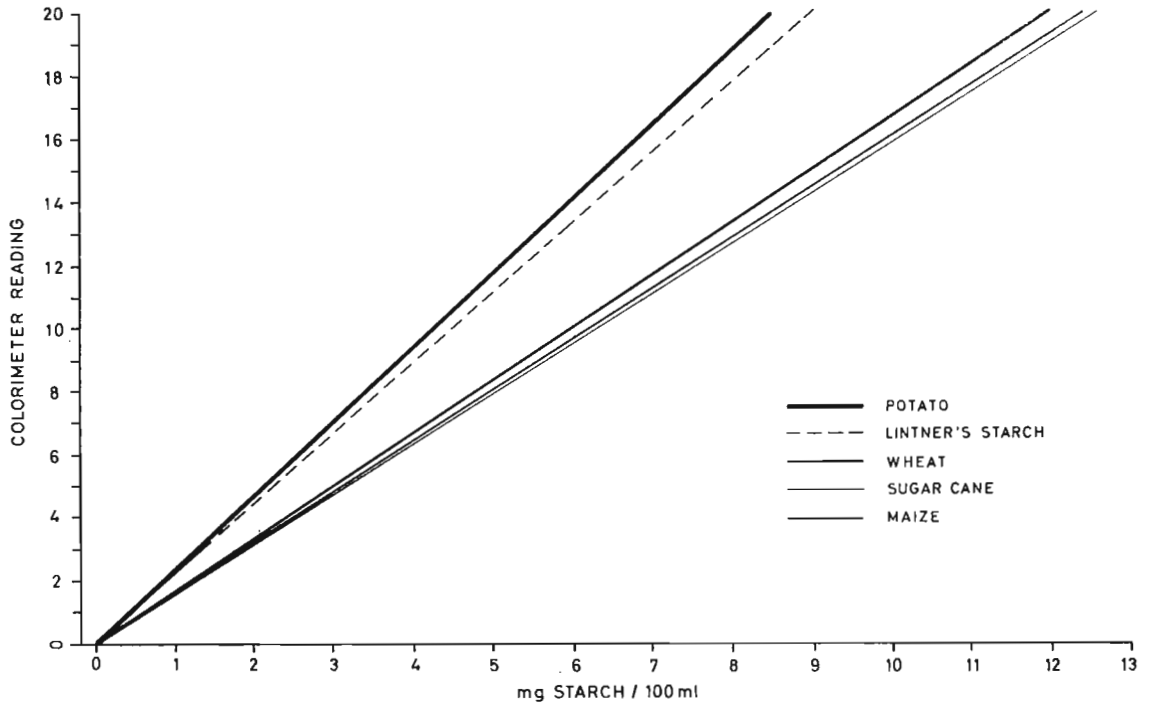


Fig. 17. Standard curves for starch determination.

Table 20. Purity and amylose content of starches

Starch	*Purity*	*Amylose % by Colorimetric Technique*	*Amylose % by Potentiometric Technique*
Potato	98.0	30	22
Lintner's	97.6	27	22
Wheat	95.3	24	21
Maize	95.3	21	23
Cane	95.7	21	19

The determination of starch in cane juices by the new C.S.R. method

The C.S.R. method having been adopted for the determination of starch in sugar, efforts were directed at adapting the same method to juices. A number of factory Chemists kindly helped in this work; those not equipped with a Bausch & Lomb spectronic 20, read optical densities at 650 nm on a Lumetron colorimeter. Standard curves were drawn with juices from different climatic regions of the island. The results obtained have shown that the method is well suited to the determination of starch in cane juices and it is henceforth recommended. The procedure is described in the 1970 edition of the *Official Methods of Control and Analysis for Mauritius Sugar Factories*, (p. 36 & 68) with the difference that 40 g of juice are used instead of 40 g of sugar. Bagacillo should be removed by straining the juice through a 100-mesh screen before analysis.

THE RIETZ VARIGRATOR AND THE JEFFRESS WET DISINTEGRATOR FOR DETERMINATION OF POL IN CANE COMPARED

A Jeffress wet disintegrator was acquired to meet the increasing load on the cane analysis laboratory and its performance was compared with that of the Rietz varigrators that have been utilised so far.

The tests revealed that the Jeffress machine always gave a slightly higher pol % cane figure than the Rietz one. The difference in pol % cane was 0.2 when sample size was the same for the two machines and 0.1 when the Jeffress bowl was filled to capacity.

Because of this feature it is important, when comparing samples of cane for pol content, to disintegrate all the samples from a given field trial in the same machine.

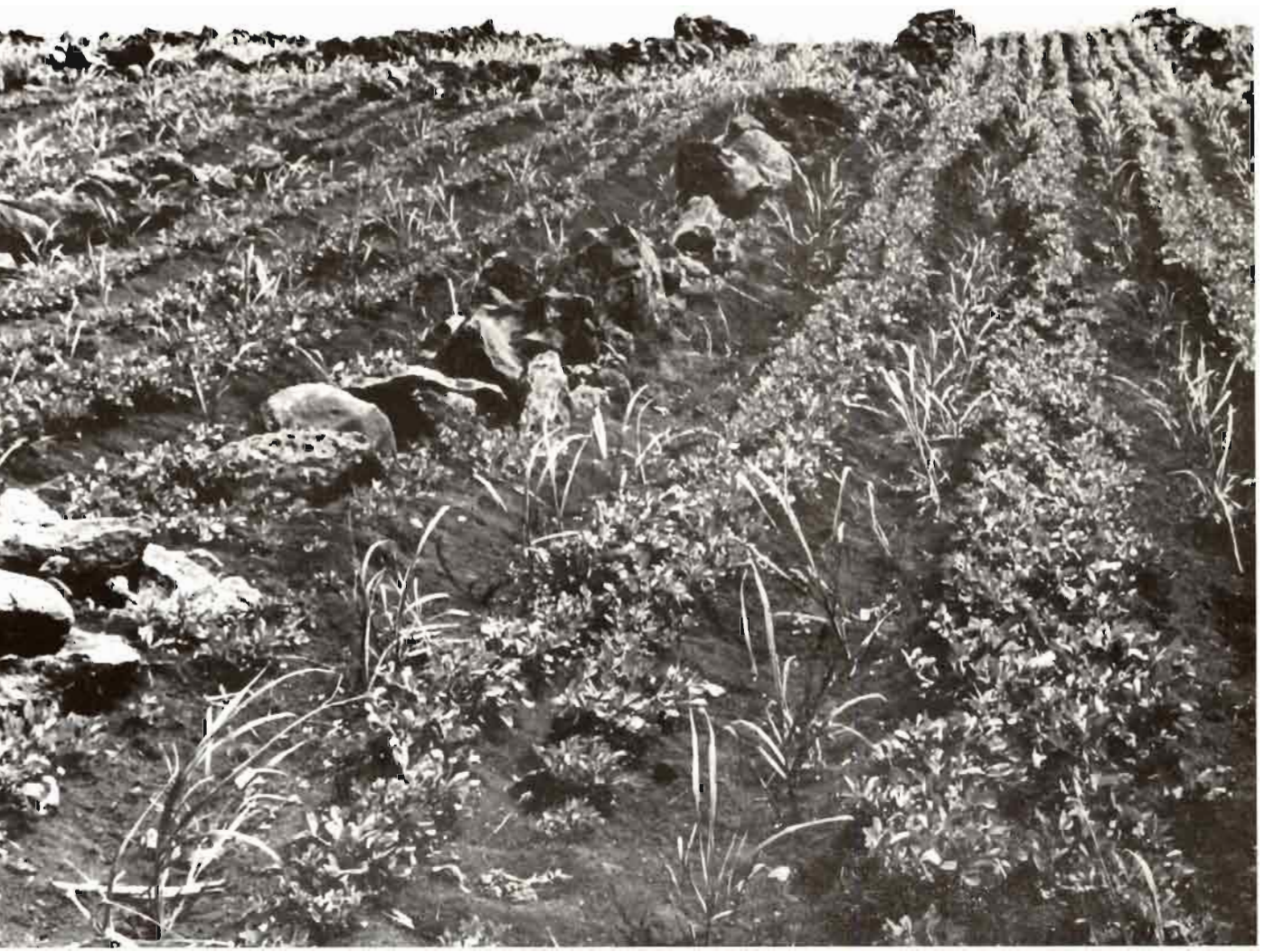
Mechanically the Jeffress machine is very robust and its maintenance costs can be expected to be low. On the practical point of view, however, a serious drawback is that the collection of fibre adhering to the underside of the bowl cover is awkward and time consuming.

MISCELLANEOUS

i) The Sugar Technology division published monthly results of expected and actual true purities of final molasses as determined by Factory Chemists. Ash determinations on this end product were carried out, throughout the crop, for factories not equipped with muffle furnaces.

ii) With the implementation of numerous new field trials, the number of cane samples analysed for the various Divisions of the Institute and for Estate Agronomists increased from 6,450 last year to 8,530. Of these, a large number involved the determination of fibre, which had not been anticipated, and resulted in great work pressure on the analysts and equipment available for this purpose.

FOOD CROPS



Groundnuts grown in the inter-rows of plant cane

Overleaf: Maize ear at early silking

FOODCROPS

MAIZE

Breeding and Selection

Selection of basic material for breeding

i) Original selfed plants (S_0)

From the basic material collected in Flacq and Savanne*, seeds from ears C_5, $C_{,6}$, C_9, C_{13} and C_{28}, out of the seven that were primarily selected were planted ear-to-row and all the plants were selfed. Only 10 plants (C_5 : 2; C_6 : 2; C_9 : 3; C_{13} : 1 and C_{28} : 2) were selected from the original S_0 plants for future development of inbred lines. That selection was essentially based on the yield components of ears, as already outlined (*loc. cit.* p. 146), and also on some important plant morphological characteristics, such as plant height, height of ear placement, number of ears per plant, stem diameter, root depth and standability.

ii) S_1 (first generation selfed) progeny

Seeds obtained from the 10 S_0 lines were planted in October 1971. Undesirable morphological traits (tangled tops, leaf crinkling and leaf striping, among others), probably due to a high frequency of recessive genes controlling vegetative characters, were noticed in the majority of the plants in all S_1 progeny. Some plants also showed arrested silk growth and in others, pollen shedding and silking were not synchronized; it is likely that some lines which do not seem to be able to stand selfing will eventually be lost. A reduction in plant height, due to inbreeding, was apparent in all the lines of that generation.

From a total of 300 plants in all S_1 lines, 235 were eliminated mainly on the basis of undesirable morphological characters.

The characteristics of the selected S_1 lines which will be planted early next year are given in Table 21.

Local production of top-cross hybrids

As a result of the Director's mission to France in September 1971, seeds of 18 single hybrids were kindly supplied by the *Station d'Amélioration des Plantes, Clermont-Ferrand*, for the production of top crosses using the local maize variety as male parent. The following is a list of these hybrids :

Quantity supplied : 100 kernels/hybrid

A 220 x D 228	F 64 x F 52	L03 x L011
A 257 x B 37	F 522 x F 19	L032 x TS20
A 632 x FC 14	F 544 B x W 182 E	Prol. Dent No. 27
F 19 x A 619	FC 14 x A 619	W 64A x A 619
F 19 x A 632	FC 14 x W 64 A	YUR 319 x A 375
F 19 x W 64 A	FC 46 x FC 235	

Quantity supplied : 15 kernels

U 6452 x 645

* *Rep. Maurit. Sug. Ind. Res. Inst.* **18** (1970) : 143-147

Table 21. Characteristics of selected S_1 lines

Location : Réduit Date sown : 3rd March, 1971

Characters	C_{55}	C_{513}	C_{612}	C_{627}	C_{94}	C_{920}	C_{923}	C_{1319}	C_{2810}	C_{2833}
Plant height (cm)	240	201	255	205	186	158	172	202	302	316
Height of ear placement (cm)	134	102	130	93	88	106	72	92	164	192
Number of ears per plant	3	2	2	2	3	4	1	2	3	3
Ear tip : open (O) or close (C)	C	C	C	C	C	O	C	C	C	C
Number of husks per ear	12	10	12	11	9	12	11	13	15	10
Total number of leaves	19	17	16	15	15	15	13	17	18	19
Number of leaves above top ear	7	7	6	6	7	5	7	7	6	7
Stem diameter (cm)	3.1	2.8	4.0	3.3	2.8	4.2	2.9	3.1	3.5	3.3
Pollen shedding (days after sowing)	70	63	65	64	74	63	68	68	78	75
Silking : (days after sowing)	68	65	65	66	72	58	66	70	72	71
Maturity : (days after sowing)	127	127	117	125	131	110	124	119	131	131
Lodging	—	—	—	—	+	—	—	—	+	—
Dry ear weight (g)	332	273	182	132	324	207	220	226	320	281
Ear length (cm)	23.5	23.0	20.0	18.0	26.0	24.0	22.5	21.5	19.0	21.5
Ear diameter (cm)	5.4	5.3	5.0	4.4	6.0	4.5	5.0	4.9	5.8	5.1
Number of kernels per row	47	50	49	27	48	53	43	51	55	44
Number of kernel rows	16	16	12	12	18	14	14	18	18	14
Weight of cob (g)	90	106	49	36	97	46	48	71	98	77
Diameter of cob (cm)	3.2	3.5	3.2	2.8	3.7	3.2	3.0	3.2	3.6	3.0
Kernel length (cm)	1.2	1.1	1.0	0.94	1.2	0.9	0.87	1.1	1.2	1.1
Kernel width (cm)	0.9	1.0	1.1	1.2	1.0	0.9	0.87	1.0	0.94	1.0
Kernel type : dent (d), flint (f)	d	f	f	f	d	d	f	fd	d	f
Kernel colour : orange (o), yellow (y)	o	o	o	o	y	y	o	o	y	o
Shelling percentage	72.9	61.2	73.1	72.7	70.1	77.8	78.2	68.6	69.4	72.6
100 grain weight (g)	43	40	33	42	46	26	40	36	38	38

Furthermore, thanks to the kindness of *Monsieur le Chef de Mission d'Aide et de Co-opération* of the French Embassy in Mauritius, 500 g of seeds of the single hybrid W 64 A x A 619 and 100 seeds of another single hybrid, F 19 x A 619, were made available by M. M. Pollacsek, of the *Station d'Amélioration des Plantes, Clermont-Ferrand.*

The local variety used as pollen parent for the top-crosses, was planted on 5 different dates (♂ 1 to ♂ 5) at 5-day intervals in an attempt to synchronize its pollen shedding with the silking date of the hybrids which was then unknown under local conditions. However, because of their much shorter growing cycle, 17 of the hybrids which were planted at the same time as ♂ 3 silked long before the pollen plants had tasseled. They were consequently hand-pollinated with pollen collected from a "mass-selected" and rather tall strain of local maize growing at Pailles.

Compared with the local variety, with the exception of A 220 x D 228 which it closely resembles, the Clermont-Ferrand hybrids were generally much shorter and had a much lower ear placement, characters making them very resistant to lodging. They also matured 4 to 5 weeks earlier than the local variety.

From these preliminary observations, supplemented by those obtained during the hybrid trials reported further, it would seem that the local variety of maize is the product of many years' selection based essentially on plant vigour (e.g. plant height, number of leaves, leaf surface area, etc.) rather than on grain yield capacity.

The top-crosses will be compared between themselves and with the local variety in a trial to be set up next March.

Hybrid trials

In addition to the hybridization and selection programmes which are in progress, hybrids from countries where Stewart's disease (*Xanthomonas stewartii*) and downy mildew (*Sclerospora sacchari*) are not known to occur, are introduced and compared under our conditions with the local variety for grain yield and certain morphological characters.

i) Hybrids introduced from Israel

Six top hybrids, viz., 90-1, 186-1, 87-8, 111-8, 166-8 and 286-8 were obtained from the Corn Breeding Department of the Government Agricultural Experiment Station, Neve-Yaar, Israel, through the co-operation of Mr. S. Sneh of the Israeli Agricultural Team in Mauritius. They were tried at Réduit Experiment Station as from mid-December 1970.

Heavy rains accompanied by cyclonic winds during the tasseling period damaged the plants and caused considerable stalk lodging and leaf shredding in all hybrids and also in the local variety; the yields were consequently adversely affected.

From the data collected during the trial, it was found that :

(a) the yields of the hybrids did not differ significantly from that of the local variety; however, it is possible that under normal climatic conditions, the hybrids from Israel may yield better.

(b) the height of insertion of the ears of hybrids 87-8 and 166-8 was lower than that of the other hybrids, and much lower than that of the local variety which itself also showed a much higher susceptibility to lodging. On account of its deeper and more extensive root system, it would appear that hybrid 166-8 may be the least susceptible to lodging.

(c) hybrids 87-8 and 166-8 showed a net gain in earliness as compared to the local variety.

ii) Hybrids introduced from Holland and France

Seven Dutch and 13 French hybrids were obtained through the courtesy of the Universal Development Corporation Ltd., Mauritius, and were tried in November 1971 together with the local variety. The following is a list of these hybrids :

From Holland : Campo, CIV-2, CIV-326, CIV-330, CIV-92, ONA-36, and ONIX-95.

From France : Anjou 210, Anjou 360, Anjou 450, Anjou 500, Anjou 510, BC 420, MA-1100, MA-1178, MA-1217, Provence 480, United-32 A, United-302 and United-550.

The trial was carried out at Réduit Experiment Station at a density of 40,000 plants per hectare (equivalent to approximately 16,900 plants per arpent).

Until pure lines of the local variety of maize to be utilized for the production of top-cross local hybrids become available, it is thought that in order to increase the production of grain maize in Mauritius, as well as in Rodriguez, the cultivation on a fair scale of some of the high-yielding hybrids included in the above list should be tried either in pure stands or in ratoon cane interrows. It is therefore considered that some of the preliminary results obtained so far in that trial should be placed on record (Table 22). Considering their yield and disease reaction, statistical analysis showed that the following are the outstanding hybrids, in order of preference : United-32 A, Anjou 500, MA-1217, MA-1178, Anjou 360, Anjou 510 and United-302.

All the hybrids under reference, as well as those received from Clermont-Ferrand already mentioned, are characterized by early silking, early maturity, reduced vegetative growth, low plant height and ear placement and resistance to lodging, as evidenced from the data given in Table 22 which also include an assessment for diseases, such as rust (*Puccinia polysora*) and leaf blight (*Trichometasphaeria turcica*), carried out by the Plant Pathology Division.

Diseases

Reaction of newly-introduced varieties to diseases

i) Rust

Six hybrids introduced from Israel showed more resistance to rust (*Puccinia polysora*) than the local variety. Furthermore, of the 38 hybrids introduced from France, 3 were more resistant than the local variety; 28 had about the same reaction, i.e. moderately susceptible; and 7 were more susceptible.

ii) Leaf blight

Eight of the French hybrids had about the same reaction to leaf blight (*Trichometasphaeria turcica*) as the local variety, i.e. resistant, and 30 were more susceptible.

iii) Bacterial soft rot

A stalk and ear rot of maize caused by one of the soft rot bacteira (presumably *Erwinia carotovora*, as reported elsewhere) was observed in a few imported hybrids in March and December. The affected parts appear light tan to dark brown, soft, water-soaked and later turn to a slimy consistency with a strong and unpleasant smell of decay. The incidence of the disease which seems to be related to increasing soil moisture is liable to assume serious proportions in irrigated plantations.

POTATO

Varieties received in 1971

The following varieties were received during the year :

(a) From *La Station de la Pomme de Terre*, Libramont, Belgium :

Electre	*Nervia*
Gari	*Reina*
Mariline	*S 14*

(b) From *La Fédération Nationale des Producteurs de Plants de Pomme de Terre*, Paris, France :

Ackersegen	*Kerné*
Arran Banner	*Kerpondy*
Catarina	*Régale*
Claudia	*Spartaan*
Claustar	*Valdor*

(c) From *Instituut voor Rassenonderzoek van Landbouwgewassen*, Wageningen, Holland :

Alpha	*Multa*
Arka	*Nascor*
Donata	*Patrones*
Gineke	*Resy*
Jaerla	*Spartaan*

(d) From the Seed Potato Marketing Board, Belfast, Northern Ireland.

Maris Peer	*Ulster Concord*
Pentland Dell	*Ulster Torch*

The kind co-operation shown by the above-mentioned institutions in generously supplying certified seeds of these varieties for experimental purposes is gratefully acknowledged.

Though the seeds of the majority of the above-mentioned varieties were received in a poor physiological state, they were planted in a series of preliminary trials in comparison with the variety *Up-to-Date* of which seeds (Grade "A") had just been obtained from South Africa. Because of the quality of their seeds, the yields of most of the European varieties were, as expected, generally lower than that of the control (*Up-to-Date*). A very important result was observed with the Belgian variety *Mariline* in a trial carried out at Constance in a field which was very severely infested with *Pseudomonas solanacearum*, the pathogenic bacterium of wilt. This variety, compared to many others including *Up-to-Date*, showed a high tolerance to this disease and its yield was consequently outstanding; also, in all the other trials, in spite of the poor quality of the seeds that were planted, its yield compared favourably with that of the control variety *Up-to-Date*. Furthermore, in its reaction to late blight, *Mariline* was definitely more resistant than *Up-to-Date*, particularly in a trial laid down in the super-humid zone where climatic conditions are very favourable to that disease. This variety will be planted on a semi-commercial scale next year with the object of obtaining more precise information on its overall behaviour.

As all the varieties listed above were grown under strict insect and disease control, the harvested tubers will be treated as "once grown" seeds and they will be compared with *Up-to-Date* ("once grown" and "A" seeds) next year when more conclusive assessment of their behaviour should be arrived at under our different climatic conditions.

Trials with varieties "Once Grown" in Mauritius

These trials which were carried out at Pamplemousses Experiment Station (sub-humid, irrigated zone) and Union Park (super-humid zone) included the following varieties which had been grown in 1970 under strict insect and disease control.

Varieties originally received from :

Holland	:	*Alpha, Arka, Désirée, Furore, Gineke, Multa, Nascor, Patrones, Radosa, Spartaan*
Australia	:	*Greta*
South Africa	:	*Up-to-Date*

They were compared with variety *Up-to-Date* seeds "once grown, 1970" in Mauritius From harvest (August 1970) to about 2 weeks before planting (June 1971) the "once grown" seed had been kept in cold storage (3-4°C) at the Agricultural Marketing Board.

Results of the trials are given in Table 23. Both "Total Yield" and "Yield of commercial tubers", i.e. > 32 mm, are expressed as percentages of the corresponding yields of *Up-to-Date* "once grown" seeds.

These results show that the varieties *Greta* and *Désirée* are superior to *Up-to-Date* in yield (total and commercial).

Greta was superior to *Up-to-Date* in both total yield and yield of commercial tubers in the sub-humid (irrigated) zone; in the super-humid zone, its total yield was practically the same as that of *Up-to-Date*, while its yield of commercial tubers was superior. *Greta* is highly resistant to late blight, while *Up-to-Date* is susceptible to highly susceptible ; it has also shown a very much higher tolerance to bacterial wilt than *Up-to-Date*.

Table 23. Potato variety trials, 1971

Seed "once grown, 1970" in Mauritius
Yields compared to that of variety Up-to-Date ("once grown, 1970")

Varieties	*Sub-humid (Irrigated) Zone*		*Super-humid Zone*	
	Total Yield	*Yield Commercial Tubers (> 32 mm)*	*Total Yield*	*Yield Commercial Tubers (> 32 mm)*
Alpha	92.8	108.2	104.8	128.2
Arka	79.8	105.2	88.3	93.2
Desirée	*120.7*	*154.7*	103.3	125.8
Furore	59.9	50.3	106.9	114.8
Gineke	64.5	81.6	106.5	105.7
Greta	*106.9*	*122.5*	99.2	117.1
Multa	55.6	55.0	103.3	133.6
Nascor	89.9	90.1	89.5	110.3
Patrones	55.9	50.4	53.8	57.2
Radosa	105.6	140.3	97.7	112.6
Spartaan	99.6	104.6	91.0	96.4
Up-to-Date	*100.0*	*100.0*	*100.0*	*100.0*

It is estimated that on account of its tolerance to late blight and wilt, *Greta*, a good yielder, could be planted earlier than *Up-to-Date*, i.e. as from the first fortnight of April, and might perhaps supplant this variety in commercial plantings in Mauritius. In this connection, steps have been taken to obtain 10 tonnes of certified seeds of that variety from Australia; these seeds will be planted in June-July 1972 for the purpose of producing seeds for planting on a fairly wide scale in early 1973.

Désirée, a better yielder (total yield and commercial grade yield) than *Up-to-Date* in both climatic zones, is less susceptible to late blight than this variety but is as susceptible to bacterial wilt. There are reasons to believe that *Désirée* may outclass *Up-to-Date* in yield when planted during the months of May to August when the incidence of the wilt pathogen is at a low level.

Other interesting varieties are :

(*i*) *In the sub-humid (irrigated) zone : Radosa* and *Spartaan*

Spartaan, which is as good as *Radosa* as a yielder, should be preferred on account of its much higher resistance to late blight. However, being as susceptible to bacterial wilt as *Up-to-Date*, *Spartaan* may be grown within the period May-August during which wilt is at its lowest level of incidence.

(*ii*) *In the super-humid zone : Alpha*, *Furore*, *Multa* and *Gineke*

Both *Furore* and *Multa* which have practically the same yield potential should be preferred to the two other varieties, *Alpha* and *Gineke*, on account of their marked resistance to late blight. It should, however, be noted that *Multa* gave a better yield of commercial tubers than *Furore*. Both varieties are as susceptible to wilt as *Up-to-Date* and may be grown only between May and August for the reason already given.

Spacing-fertilizer trials in inter-rows of virgin canes (erect and recumbent types)

Four trials were laid down in July in the humid and sub-humid (irrigated) zones; they were set up in each zone in interrows of the cane varieties S 17 (erect type) and M 124/59 (recumbent type) respectively. One row of the potato variety *Up-to-Date* was planted per cane interrow in all the trials just after the cane setts had been planted. The different spacings between seeds and fertilizer levels was randomized in all four replicates of each trial.

On account of strong wind which caused up to 70% damage to the potato foliage during the tuberization period of the plants in the trials situated in the sub-humid (irrigated) zone, results at harvest were very erratic and no conclusions could therefore be drawn therefrom.

Results obtained in the trials carried out in the humid zone are given in Table 24.

It follows that :

i) the yield of the potato variety *Up-to-Date* planted at spacings of 16 cm, 24 cm and 32 cm between seeds, is not affected by cane growth whether this crop is grown in interrows of virgin canes (one row of potato per cane interrow) of either the erect (S 17) or recumbent (M 124/59) type.

ii) Although the potato yield increases with diminishing seed spacing, profitability decreases. Statistical analysis revealed that, as far as profitability is concerned, the 32 cm-spacing between seeds is significantly superior to those obtained with either the 16 cm-, or 24 cm-spacings. This new finding confirms the results obtained in 1970 (*Rep. Maurit. Sug. Ind. Res. Inst.* **18** : 143) in pure stand plantings.

iii) As for fertilization, there is no significant difference in the profitabilities obtained at the 32 cm-spacing between seeds. However, it would seem that the maximum profitability is reached when using a fertilizer rate of about 650 kg of 12 : 12 : 17 : 2 per hectare of virgin cane where all interrows are planted with potatoes. This also confirms the results obtained in 1970 (*loc. cit.*) when best yields were obtained with a fertilizer rate of 1260 kg of 12 : 12 : 17 : 2 per hectare of potatoes planted in pure stand.

The co-operation of the Manager and Field Staff of both Britannia S.E. and Réunion (Tamarin) S.E., where the above trials were carried out, is gratefully acknowledged.

Nutrition

Nitrogen, phosphorus and potassium fertilizer trials were carried out at the four experiment stations of the Institute.

Application of nitrogen in two split doses (half dose below the seed at planting and the other half one month afterwards) gave no increase in yield over the single application (whole dose below the seed at planting).

However, a highly significant response to nitrogen application up to 170 kg N per hectare was obtained in all the four trials. Trials will be repeated in order to cover a narrower range of nitrogen levels.

Phosphorus deficiency symptoms were diagnosed at Union Park, and to a lesser degree at Pamplemousses. Consequently, there was a slight positive yield response to phosphorus in these trials. No yield response was obtained at Réduit and Belle Rive.

There was no response to potassium application up to 340 kg K_2O/hectare in any of the four trials.

Pests

General

Potato fields were examined continually during the season to collect and identify the insects occurring on potato and to gauge their status as pests. The efficacy of insecticidal treatments that had been recommended was also observed. About 20 species feeding on potato were collected. The most important pests were leaf-eating caterpillars, particularly *Spodoptera littoralis* Boisd. and *Plusia chalcites* Esper, the cutworm *Agrotis ipsilon* Hub., and the tuber moth *Phthorimaea operculella* Zell. Sucking insects and red spider mites were infrequent pests and treatments for their control were seldom necessary. Excellent control of leaf-eating caterpillars was obtained with Methomyl and Azinphos-methyl when spraying was efficiently carried out.

The tuber moth, *Phthorimaea operculella*

A survey of damage to tubers by insect and other pests was made primarily to determine the importance of the tuber moth in the field and the need for control measures. Forty fields were sampled at, or near harvest, and the tubers comprising each sample brought to the laboratory for examination. Tuber damage of significance was of three kinds : (i) large cavities or burrows believed to be caused mostly by cutworms; (ii) galling of surface tissues by root-knot nematodes, *Meloidogyne* sp., and (iii) mines and decay caused by tuber moth larvae. Total pest damage to tubers per field, by weight of tubers, varied from 0 to 71% with an average of 6.8%. There was no discernable pattern in the incidence of cutworm-type damage and nematode damage : the former occurred throughout the season in all regions and was seldom serious, exceeding 10% by weight of tubers in only 4 fields, while nematode damage was severe in only 2 adjoining fields where over 50% of the tubers were galled.

Damage by tuber moth larvae, by contrast, was evidently seasonal, being absent or negligible in early plantings and increasing as the season progressed. It was also obvious that moths made their appearance in numbers in the fields only after the onset of warm summer weather, when leaf infestation became common. Fig 18 shows the incidence of insect damage in relation to planting date in the fields examined. The average loss of tubers from tuber moth in August plantings was nearly 15% by weight of tubers but reached 40-45% in two fields. The results of this survey may have been affected to some extent by insecticidal treatments that had been carried out in many fields for control of leaf-eating caterpillars but they suffice to show that tuber moth can be important in late plantings where precautions against attack are necessary. These comprise deep planting, good earthing-up, and application of insecticide if foliage becomes infested.

Potato aphids

Aphids on potatoes in Mauritius seem to cause no direct damage of any consequence : no fields were seen in 1971 where their numbers were such as to affect plant growth and necessitate treatment with insecticide. Their importance as vectors of virus diseases is also very limited at present owing to the use of imported certified seed. The commonest of the virus diseases occurring locally, namely Leaf Roll, which is aphid-borne, is found at low incidence from (secondary) seed infection and appreciable (primary) aphid-borne infection has been reported as occasional in the late stage of crop growth, more particularly in out-of-season summer plantings.

Aphid transmission of disease will, however, become of greater concern if seed is to be produced locally and work was begun during the year to obtain data on the species of aphids present in potato fields and their possible significance as disease vectors.

Existing information recorded three species on potato — *Macrosiphum euphorbiae* (Thos.), *Aphis gossypii* Glov., *Myzus persicae* (Sulz.) — and indicated that the latter was rare. Examination of fields confirmed the presence of these species but also revealed *Aulacorthum* sp. probably *solani* (Kltb.). All four species breed on potato. A fifth species, *Schizaphis cyperi* (V. de G.), which breeds on the common weed *Cyperus rotundus*, was also collected on potato. Both *Aulacorthum* sp. probably *solani* and *Schizaphis cyperi* were not previously known to exist in Mauritius.

Data on the incidence of the different potato aphids is still poor and confined to impressions gained during routine field visits. However, *M. euphorbiae* seemed to be the commonest species in the cooler months, while from September onwards, the other species were also frequently found. Contrary to previous information, *Myzus persicae*, a very important vector of disease, is by no means uncommon and was found to be numerous in all fields examined in October.

Disease situation and epidemiology

Blight (*Phytophthora infestans*)

In 1971, a normal blight year, the disease started in June in certain localities but did not seriously affect plantations established early in the cool season. Several plantations during that period were in fact blight-free even where no spraying had been carried out. However, later in the season (in August) up to 100% defoliation was encountered in untreated plots in humid and super-humid regions while in sub-humid regions infection reached only 20% or less. As in 1970, unusual blight symptoms on stems were encountered late in the season during the drier months of October and November. One plantation in the super-humid zone was infected to the extent of 76% in early November after a few showery spells in combination with low night temperatures.

It seems that there is a critical period when maximum temperature is above 24°C, during which blight is unimportant in Mauritius, particularly when the weather is dry. Only insurance sprays at long intervals are therefore necessary during the hotter months in the drier localities.

Bacterial wilt (*Pseudomonas solanacearum*)

On the whole, little bacterial wilt was encountered during the year except in the eastern sector.

Virus diseases

Leaf roll incidence in commercial plantations originating from imported South African A-grade seeds was very variable. In variety *King George* imported early in the planting season, the incidence was less than 1%. Some consignments of *Up-to-Date* had 1% leaf roll (Tamarin, Anna, Labourdonnais), others 3.4 % (Mount, Beau-Champ, Rose-Belle), whereas in two cases (Britannia, Constance) heavy infection, up to 15%, was observed. An incidence of 30% leaf roll was recorded in variety *Maris Peer* imported from the same country.

Miscellaneous observations

Potatoes harvested in November at Britannia and Terracine showed brown flecks in the flesh. Many affected tubers were "scaly" on the exterior. This problem is believed to be identical to "internal brown fleck", a physiological disorder which had been reported in South Africa in dry acid soils.

A very severe infection of scab (*Actinomyces scabies*) seriously affected the market value of a crop in a field which had been previously limed for groundnut cultivation.

Powdery scab (*Spongospora subterranea*), usually of rare occurrence, was severe in a field planted during the cool season in the humid zone.

Disease resistance assessment

The resistance to major diseases of 34 newly imported varieties, was assessed in three field trials in different localities. In the case of blight, reaction was also assessed by inoculation of potted plants in the greenhouse with isolates from two localities. The reaction of the varieties to blight and wilt in these trials are given below :

Reaction to blight

Group 1. Highly resistant
Greta, Maris Peer, Pentland Dell, Spartaan, Ulster Concord.*

Group 2. Resistant to moderately resistant
Arka, Ackersegen, Catarina, Donata, Furore, Jaerla, Mariline, Multa, Nascor, Nervia, Resy, S 14.

Group 3. Moderately susceptible to susceptible
Alpha, Désirée, Electre, Gari, Gineke*, Kerné, Kerpondy, Régale, Reina.*

Group 4. Susceptible to highly susceptible
Arran Banner, Claudia, Claustar, Delaware, King George, Patrones, Radosa, Ulster Torch Up-to-Date* (Control).

Blight progress curves for a few varieties are illustrated in fig. 19.

* These varieties reacted differently in 1970 trials (*Rep. Maurit. Sug. Ind. Res. Inst.* **18**, 1970: 102-103), and will be tested again in 1972.

Reaction to bacterial wilt

Group 1. Very tolerant
Mariline

Group 2. Tolerant
Gari, Greta, Kerné

Group 3. Susceptible (less than Up-to-Date)
Catarina, Claustar, Electre, Kerpondy, Maris Peer, Régale.

Group 4. Susceptible (more than Up-to-Date)
Ackersegen, Alpha, Arka, Arran Banner, Claudia, Donata, Gineke, Jaerla, Multa, Nervia, Patrones, Pentland Dell, Reina, Resy, Spartaan, Ulster Concord, Ulster Torch.

Preliminary observations on virus diseases

The following virus diseases were observed as secondary infection in imported seeds :

Leaf roll	*Alpha, Arka, Claudia, Claustrar, Désiréé, Donata, Gari, Multa, Pentland Dell, Régale, Spartaan.*
Virus Y	*Spartaan*
Viruses X + A	*Régale*

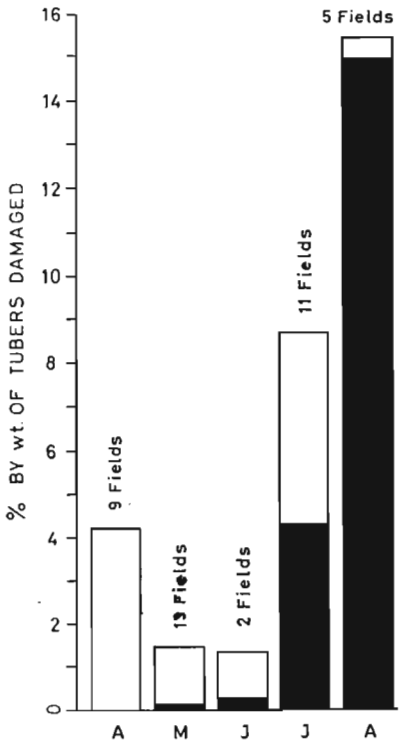


Fig. 18. Insect damage to potato tubers in 1971 in relation to date of planting. The black portion of each column represents damage by tuber moth.

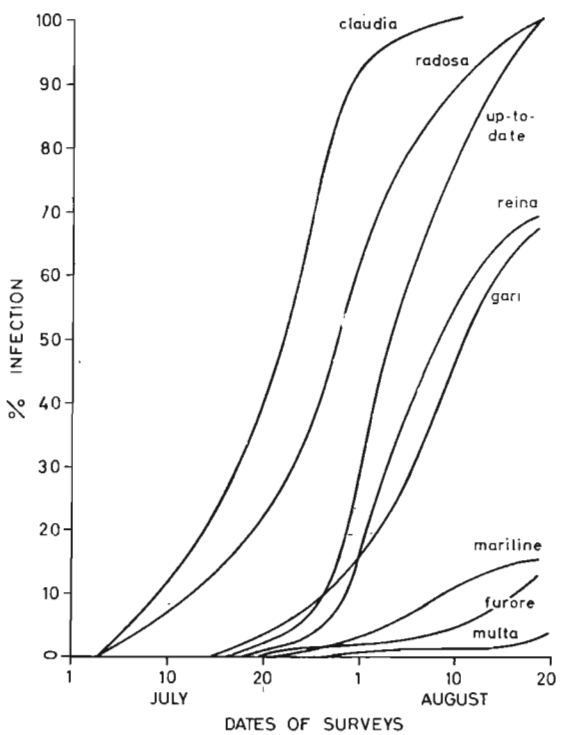


Fig. 19. Blight infection curves for different potato varieties in 1971 field trial.

Reaction of potato clones to bacterial wilt

In addition to the above assessment on commercial varieties, 16 potato clones from Colombia and 16 *S. tuberosum* wild potato hybrids from Wisconsin were tested both in the cool and in the warm season for reaction to wilt in a highly infected soil. In the cool season when conditions were not optimal for wilt infection, only 2 from Wisconsin and 11 from Colombia were found susceptible. In the warm season when severe wilt conditions prevailed, most varieties were infected, some being very highly susceptible. Four from Colombia and five from Wisconsin have not yet shown infection. Final tests under moderate wilt conditions will be conducted in 1972.

Investigations

Fungicide trials

Three fungicide trials were performed during the year in different localities to compare copper fungicides and the new fungicide Daconyl with the standard Dithane M 45, using power sprayers. No infection occurred in one trial and the depressive effect of copper compounds on yield was observed, an effect not obtained with the other two fungicides. In the other two, infection was medium and heavy, reaching 76% and 100% respectively, at harvest in untreated plots. Both Dithane M 45 and Daconyl gave excellent control, increasing yield by 92% and 74% respectively in the trial under heavier infection (fig. 20.) and 16% and 15% respectively in the one with medium infection.

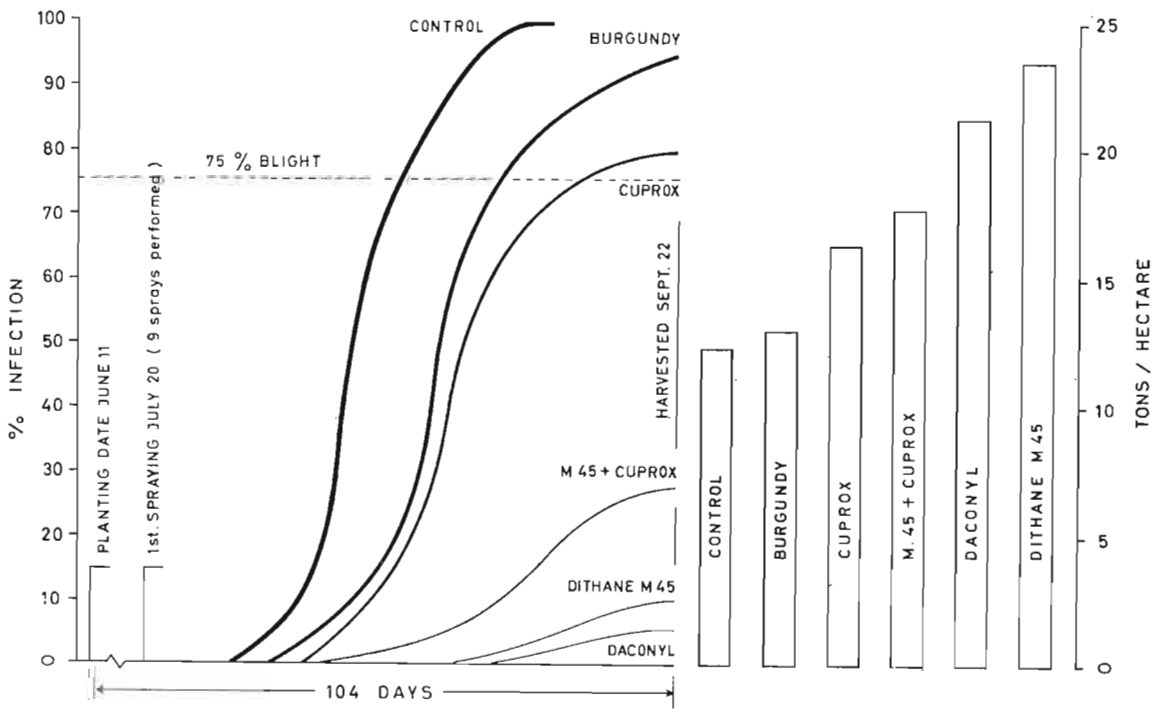


Fig. 20. Blight infection curves and yields in plots of potato variety Up-to-Date treated with different fungicides.

Certified seed production

Recommendations on the implementation of a certified seed production scheme were made in *Private Circulation Report* No. 25 : *The production of seed potatoes in Mauritius.*

Phase I of the project was launched in 1971. Already established potato fields planted with "A" certified seeds of the *Up-to-Date* variety imported from South Africa were chosen from the following estates: Anna, Beau Champ, Beau Plan, Britannia and Réunion (Tamarin). During growth all plants showing symptoms of important diseases were rogued, and adequate insecticidal treatments were applied to reduce the incidence of aphid-borne virus diseases. Two fields had to be abandoned owing to bacterial wilt infestation higher than the acceptable level in one, and heavy tuber moth attack in the other.

About 30 tonnes of seeds were obtained from the other three estates and were stored at 2-3°C at the Agricultural Marketing Board. After 5-8 months storage, these seeds will be planted in about 10 localities in 1972 in early, optimum and late seasons. Experiments will also be conducted to compare yields from such seeds with those from imported seeds. It would appear that the cost of first generation locally produced seed derived from imported stock would be about half that of the latter.

Virus diseases

Two virus diseases, potato virus M and potato virus S were identified for the first time by serological tests.

GROUNDNUT

Introduction of new varieties

The following varieties were introduced during the year :

(a) *NC 5* and *Va 56 R* from the United States of America. These varieties being of the semi-runner type, it is unlikely that they will be grown extensively in Mauritius on account of difficulties encountered with our manual harvesting practice.

(b) *Hybrid 33, 61-24, 57-103, Mwitunde, Valencia 247* and *SA 291* kindly supplied by Monsieur J. Marquette of the *Institut de Recherches Agronomiques de Madagascar.*

(c) *55-437* from Sénégal. This variety which is said to be drought-resistant was received through the courtesy of Monsieur P. Gillier of the *Institut de Recherches pour les Huiles et Oléagineux*, Sénégal.

(d) *UF 71316*, an experimental sister line (bunch type) of the variety *Florunner*, though not yet officially released by the University of Florida, U.S.A., was very kindly supplied by Professor A.J. Norden of this University.

The above-mentioned varieties are being propagated with a view to assessing their yield and the oil content of their seeds in due course.

Variety trials

Five varieties of the Virginia type : *NC 2, Virginia Bunch Improved, Shulamit, GH 119-20* and *Florigiant*, and the local (Spanish) variety, *Cabri*, were planted in each of three trials laid down in two soil types, viz., one trial in a Humic Ferruginous Latosol and the two others in Low Humic Latosols of which one was under irrigation.

Results obtained showed that in all the trials, the Virginia varieties gave much higher yields than the variety *Cabri*. Although the yields of the Virginia varieties did not differ considerably between themselves in each of the trials, variety *Shulamit* generally outyielded the others. As expected, the yield of all the varieties were comparatively higher when planted under irrigation. These findings are corroborated by the results of yields obtained under field conditions for Virginia varieties *Shulamit* and *Virginia Bunch Improved* on 15 sugar estates (Table 25).

Nutrition

Fertilizer trials with nitrogen, phosphorus and potassium were carried out at two sites : (a) Belle Isle, sub-humid climate, Low Humic Latosol of pH 6.8; (b) Bel Etang, super-humid climate, Latosolic Brown Forest of pH 5.7. All the treatments at Bel Etang received, in addition, a dressing of 4.5 tonnes slaked lime per hectare. The varieties used were local *Cabri* and *Virginia Bunch Improved.*

A small yield response to a dressing of 110 kg N per hectare was obtained at Belle Isle but not at Bel Etang.

There was no response to the application of up to 180 kg P_2O_5 and 180 kg K_2O per hectare, respectively, at any of the two sites.

The effect of the application of lime at planting and of gypsum after 30 days was also studied on the variety *Virginia Bunch Improved* at the two sites. As expected, no yield response to either lime or gypsum was obtained at Belle Isle. However, gypsum application significantly increased yield at Bel Etang, while liming had no effect. In the new series of trials, the effect on shell filling will be studied

Aflatoxin

Aflatoxins are toxic metabolites produced by the fungus *Aspergillus flavus*. One of the main requirements of good quality edible groundnuts is that they should be free of aflatoxins. The analysis of aflatoxin in groundnuts has been carried out using thin layer chromatography according to the Tropical Products Institute *Report* No. G 13. When groundnuts are dried to a total moisture content of about 8% before storage, the chances of aflatoxin being produced are considered to be negligible. For example, a batch of 19 groundnut samples from sugar estates had a moisture content between 5.4 and 15.4%, with an average moisture content of 8.4%. One of these samples had an aflatoxin B1 concentration of 0.022 p.p.m. in the kernels, while the concentrations in all the other samples were too low to be detected. According to the T.P.I. Report, samples with less than 0.05 p.p.m. of aflatoxin B1 are classified as of low or zero aflatoxin B1 levels. The concentrations of other aflatoxins are normally lower than that of B1 in groundnuts.

From the results of analysis carried out so far, abnormal levels of aflatoxin have rarely been detected.

Pests

General

An appreciation of the general pest situation in groundnuts was obtained by field inspections during the 1970-71 season and the details have appeared in *La Revue Agricole et Sucrière de l'Ile Maurice* (DOVE & WILLIAMS, 1971). The main pest in most regions is the leaf-eating caterpillar *Spodoptera littoralis* and severe, if not complete, defoliation may occur at any time during the growth of the crop. The leaf tier, *Lamprosema indicata*, seldom affects young plantations to any great extent but often becomes abundant in the later stages of crop growth : all plantations seem eventually to become infested to some degree by this insect but the damage done by an individual caterpillar is comparatively slight and control measures are necessary only if large populations build up in later growth. Other leaf-eating caterpillars (*Heliothis armigera*, *Maruca testulalis*, *Plusia chalcites*) contribute to foliar damage but in their own right are unimportant. The cutworm *Agrotis ipsilon* is occasionally injurious to seedlings in wetter areas and apparently can cause injury to pegs and pods in later growth. Caterpillars of *Cydia ptychora* on occasions severely attack the apices of shoots at the growing point.

Sucking insects are of secondary importance. The thrips, *Scirtothrips aurantii* Faure is common and causes discoloration and distortion of leaves. *Aphis craccivora* Koch sometimes heavily infests young plant tissues, including pegs. A leafhopper, *Empoasca* sp., and the red spider mite, *Tetranychus macfarlanei* Baker & Pritchard, are infrequent pests. Pesticide treatments directed specially against sucking pests, have seldom, to date, proved to be necessary.

Diseases

Assessment of reaction to major diseases

Of eight varieties tested in three localities, all showed good resistance to bacterial wilt, which does not appear to be as damaging as in potatoes, except under extremely favourable conditions and in certain soils where there has been a build-up of the disease. The local variety *Cabri* showed comparatively high resistance.

The varieties were found susceptible to *Cercospora* leaf spot, the local variety *Cabri* being highly susceptible.

Investigations

Ascochyta leaf spot or Mud spot

This disease which is assuming an increasing economic importance, particularly in the wetter localities, has been identified as *Mycosphaerella argentinensis* Frezzi (imperfect stage *Ascochyta arachidis* Woron.). Different stages in the life cycle of the fungus have been observed and a detailed study of the organism is being undertaken with a view to its control which has so far proved difficult.

Epidemiology *of Cercospora* leaf spot

Research and experimentation in 1971 have yielded more precise information on the epidemiology of the leaf spot due to the two *Cercospora* spp. and have allowed more rational control recommendations. To obtain a complete picture of the epidemiology of the disease in plantations made at different periods of the year, observations of disease intensity were regularly made in 2 localities : one humid and the other sub-humid. Progress curves of the disease at different intervals of the year were thus obtained and are presented in fig. 21 along with meteorological records.

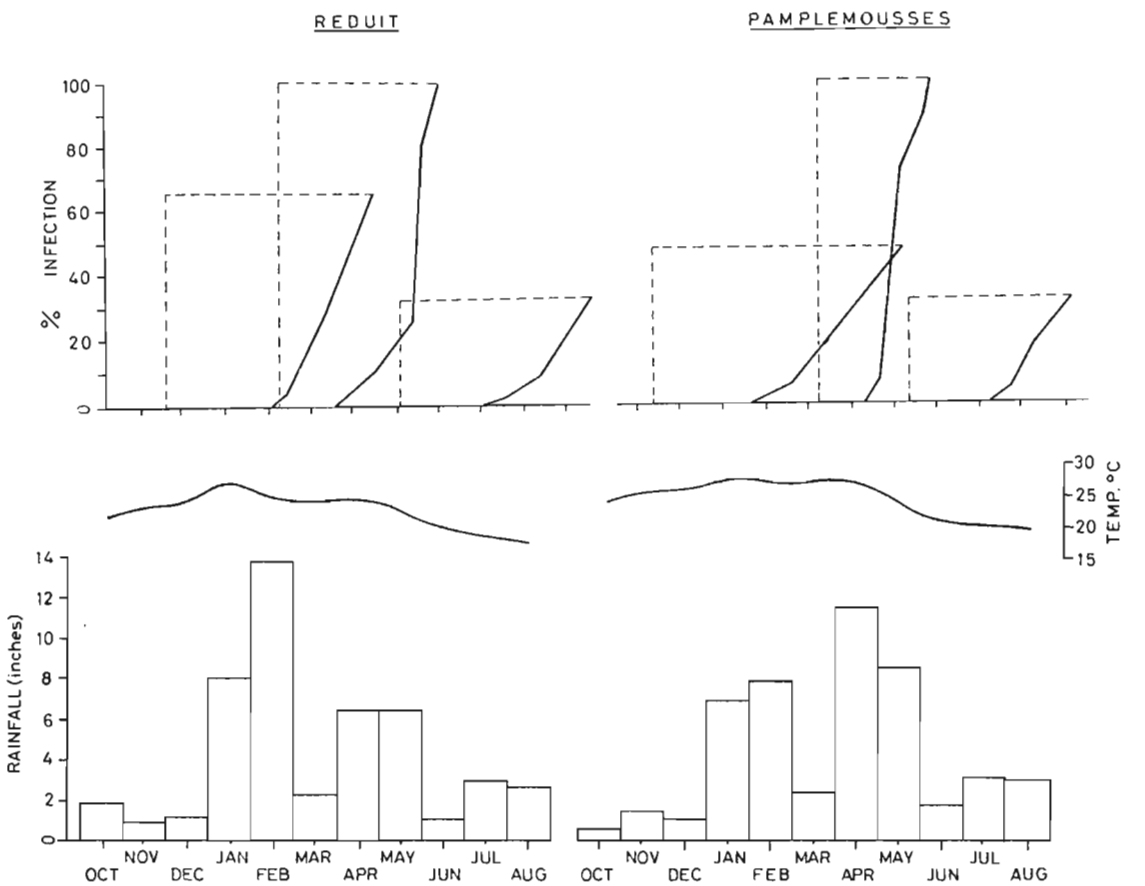


Fig. 21. Progress curves of *Cercospora* leaf spot disease in plantations made at different times of the year in two environments (*above*) and corresponding meteorological records (*below*).

The following comments can be made from the information obtained :

(i) The disease is practically absent in late winter-early summer plantations. August plantations for example, may be harvested with a low level of *Cercospora* infection without any fungicidal sprays.

(ii) The critical period for inoculum build-up seems to be after the onset of summer rains. It appears that the rapid spread of the disease is correlated to heavy rainfall rather than to high temperatures.

(iii) In both localities, the disease intensity reached its peak later in the warm season and at the beginning of the cool season when inoculum is massive.

(iv) There is an immunity period of at least one month from the date of plantation to the appearance of the first spots.

Fungicide trials

Eight fungicide trials were conducted during the year in five different localities. The trials aimed at the following :

(i) Testing various combinations of Benlate and Dithane M 45.

(ii) Testing the efficacy of high volume versus low volume sprays on the basis of fixed rates of application per unit area.

(iii) Testing different intervals of sprays.

(iv) Testing new fungicides.

(v) Control of *Ascochyta* leaf spot.

Recommendations based on the results of these trials were as follows :

Fungicide : Same combination of Dithane M 45 and Benlate as recommended in 1970.

Dosage : Dithane M 45 : 1.2 Kg + Benlate : 0.3 Kg in 500 litres of water per hectare (= 1 lb M 45 + 1/4 lb Benlate in 50 gallons of water per arpent of 25,600 ft row). While Benlate controls *Cercospora* perfectly, higher dosages of M 45, up to twice the amount, are necessary to obtain some control of *Ascochyta* under conditions of heavy infection.

Equipment : Best and most economic results are obtained by using a knapsack power sprayer.

Technical notes on timing of application in relation to varying climatic conditions during the year, were issued to sugar estates' growers.

Of the fungicides tested, outstanding control was obtained with Benlate, Thiabendazole and Cercobin. The latter two, having shown a depressive action on yield, will have to be tested again at lower concentrations.

Satisfactory control was obtained with Daconyl and Dithane M 45 but none at all with Callixin.

Virus diseases

A groundnut leaf curl, a new disease of minor importance which is encountered mainly on variety *Cabri* and is suscepted of virus origin, is being investigated.

SOYA BEAN

Introduction

The successful implementation of an agricultural diversification programme, under, Mauritian conditions, lies in the fullest possible use of all available land, whether it be between two cane cycles (rotational), or in virgin or ratoon cane (interrow). Up to the present, most rotational lands and virgin cane interrows are planted in groundnuts and potatoes respectively. As certain soils (heavy clays) do not favour such crops, and certain periods of the year are not suitable for potato cultivation, other profitable short cycle crops of high nutritive value are needed to make use of these soils and growing periods.

From preliminary studies, soya bean seems to be one of the crops which satisfies the above conditions. It is rich in oil and protein and can be used for human consumption and livestock feed.

Variety trials

In a first trial, soya bean varieties from the United States of America, Japan and Taiwan, obtained through the courtesy of Dr. B. Caldwell (U.S.D.A., Maryland) and Mr. Shaw Shi Ming (Chinese Agricultural Mission in Mauritius) were tested for yielding capacity at Réduit Experiment Station, in December 1970.

These varieties were :

San Kuo (Japan)	*Palmetto* (U.S.A.)
Shih Shih (Japan)	*Delmar* (U.S.A.)
Ho ko tau (Japan)	*Lee 68* (U.S.A.)
T'ai ta Kao Hsiung No. 5 (Taiwan)	*Semmes* (U.S.A.)
Chung Hsing No. 2 (Taiwan)	*Bragg* (U.S.A.)
Nung Yu 64-104 (Taiwan)	

Prior to sowing, the seeds were inoculated (skim-milk method) with a *Rhizobium japonicum* strain received from the United States.

The trial was conducted at only one location (Réduit). Although no conclusive yield inferences could be drawn therefrom for different reasons, a direct comparison of relative performances and of certain morphological characters of the varieties was, however, possible.

Wide differences in the length of the growth cycle were observed between the varieties : for example, *Shih Shih* and *T'ai Ta Kao Hsiung No. 5* can be considered as "very early" and "early" varieties respectively (70-85 days), the American varieties as "medium late" (86-100 days) and the others, which were the best yielding varieties, as "late" (101-115 days).

Plant height and size of seeds varied much between the varieties. The dry (13% moisture content) seed yield per hectare of *San Kuo* (4,555 kg.), *Ho Ko Tau* (4,683 kg.), *Chung Hsing No. 2* (4,744 kg.) and *Nung Yu 64-104* (4,304 kg.) were significantly higher than those of the other varieties (average : 2,530 kg./ha.) but were not significantly different from one another.

The oil % dry matter for all varieties ranged from 17.7 to 23.2, while the protein % dry matter ranged from 36.1 to 45.8. An inverse relationship seemed to exist between the oil and protein contents.

In view of the high yields obtained in the present trial and the high nutritive value of this crop, further trials will be carried out in other locations and at different seasons in order to select high-yielding varieties adapted to different climatic and soil conditions, if commercial planting of this crop is envisaged.

RICE

Pests

The insects of rice in Mauritius are not well known. In the pilot plantations that have been made, troublesome species have been the leaf-feeding caterpillars *Marasmia poeyalis* Boisd. (Pyralidae) and *Pelopidas borbonica* Boisd. (Hesperiidae) and the leafhopper *Nilaparvata maeander* Fenn. (Delphacidae). The latter, which has not previously been recorded from Mauritius, infests older plants at the stem bases. Other species have been collected on rice and a complete list of those found will eventually be made. It is to be remarked that stem borers, the kind of pest to be feared most, are virtually absent in rice grown locally.

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No. 1. BÉRENGER, A.E. Plant data of Mauritian sugar factories. May, 1971. 13 Tables.

Private Circulation Report
No. 25. RICAUD, C. *and* FELIX, S. The production of seed potatoes in Mauritius. July 1971. 29 p.

Discusses the various aspects of potato seed production in the light of experience gained in Mauritius and overseas ; there is a genuine possibility of producing seeds with a low maximum tolerance of leaf roll, the major limiting factor in the production. The cost of imported seed represents nearly 50% of total production costs. With cheaper seeds produced locally, extension of the planting season early and late could also be envisaged, with the risks of losses through low yield minimized for the planter. Recommendations are made for the start in 1971 of experiments on a semi-commercial scale to implement the seed potato production scheme.

Contrôle Mutuel Hebdomadaire : 22 issues.

Bulletin Hebdomadaire, Evolution Campagne Sucrière : 23 issues.

Articles in "La Revue Agricole et Sucrière de l'Ile Maurice"
ANTOINE, R. Aspects saillants de la recherche à l'Institut de Recherches Sucrières en 1969-70. **50** (3/4) 1971 : 187-193.
ANTOINE, R. La diversification agricole dans les terres de cannes à sucre. **50** (3/4) 1971 : 214-218.

DOVE, H. *and* WILLIAMS, J. Pests of groundnuts and their control. **50** (3/4) 1971 : 235-240.

The pests of groundnuts in Mauritius are named and notes are given on their habits and importance. Foliage-destroying pests include *Spodoptera littoralis*, *Lamprosema indicata*, *Agrotis ipsilon*, *Heliothis armigera*, *Maruca testulalis*, *Plusia chalcites* and *Cratopus punctum*. Sap-sucking pests on foliage are *Empoasca* sp., *Aphis craccivora*, thrips and mites, while *Dysmicoccus brevipes*, *Gonocephalum simplex* and snails attack underground parts of the plants. The most important of these pests are *Spodoptera* and *Lamprosema*, and insecticide treatments are often necessary to control them. Spraying methods are briefly discussed.

D'ESPAIGNET, J. Le séchage de l'arachide. **50** (3/4) 1971 : 345-352.

The effects of air temperature and rate of drying upon the quality of dried groundnuts are described.
The principles involved in the drying process are explained and recommendations for the conditioning of the drying air are made. A scheme for a drying plant capable of coping with an harvesting rate of 4 tonnes of green in-shell nuts per day is suggested, and the costs of implementing such a scheme are analysed.

FELIX, S. Maladies de la pomme de terre et de l'arachide à Maurice : résistance et épidémiologie. **50** (3/4) 1971 : 241-247.

The Foodcrops Research Programme of the Plant Pathology Division of the M.S.I.R.I. was focussed in 1970 on the following major diseases : bacterial wilt and blight of potato, and *Cercospora* leaf spot of groundnut.
Methods of investigations and preliminary results concerning the epidemiology of the diseases, their control with fungicides and the testing of new varieties for resistance are outlined. Of 19 potato varieties tested in 1970, only two have shown some tolerance to bacterial wilt, 5 have shown high resistance to blight. Of 9 groundnuts varieties, 2 have shown high resistance to wilt. The local variety Cabri was more susceptible to *Cercospora* leaf spot than Virginia varieties.

ROUILLARD. G. Histoire des domaines sucriers de l'Ile Maurice - IV. Moka. **50** (2) 1971 : 127-150.

Of the odd 30 sugar mills that originally operated in the Moka district, Mon Désert is the only one left. It has absorbed 20 small units in the course of more than one hundred years; the last to close down in 1946 was Alma, where chemical control was initiated in 1886 by G. Biard.
A large area of the grounds of Le Réduit, residence of the governors since 1749, has been utilised since 1890 to establish research and educational institutions : the *Station Agronomique* absorbed by the Department of Agriculture which later on created its Sugar Cane Research Station transformed into the present Sugar Industry Research Institute ; The College of Agriculture created in 1923 which has recently become a School of the University of the Mauritius.

DE ST. ANTOINE, J.D. de R. Discours du Président de la Société de Technologie Agricole et Sucrière de Maurice. **50** (3/4) 1971 : 171-173.

Publications issued abroad

RICAUD, C. Current programs in sugar cane disease research centres - (7) Mauritius. *Sugar Cane Pathologists Newsletter* **6** 1971 : 4-5.

RICAUD, C. Methods for testing the resistance of sugar cane to disease - (7) Gumming disease *ibid.* **6** 1971 : 47-50.

RICAUD, C. Further improvements in leaf scald resistance testing. *ibid* **6** 1971 : 18-19.

WONG YOU CHEONG, Y. *and* S. MC CONAGHY. An assessment of indices of available phosphate in tropical basaltic soils using ^{32}P. *Trop. Agric. Trin.* **49** 1972 : 81-87.

Related Publications

PINTO PAULO, M.E. Problemas fitopatologicos da cana de açùcar : estàgio realizado no Mauritius Sugar Industry Research Institute. *Instituto de Investigaçàò agronomica de Moçambique. Comunicaçàò* No. 64. April 1971, 52 p., Mimeo.

CONFERENCES AND VISITS

19th January — B. BUHAGIAR (Professor, School of Administration, University of Mauritius). De la formation à la promotion de l'homme dans l'entreprise. [1]

20th April — R. ANTOINE et J.D. de R. de ST. ANTOINE. Revue des travaux du M.S.I.R.I. en 1971. [2]

26th April — H. E. MOORE jr. (Professor, Cornell University, Bailey Hortorium). Palms : variations on a simple theme. [3]

11th May — G. MC INTYRE. Nouvelles données sur les herbicides. [2]

17th-21st May — VIe Congrès, Société de Technologie Agricole et Sucrière de l'Ile Maurice. [1]

11th June — P. BAUDIN (Maître de Recherches à l'Université de Madagascar) et C. RICAUD. Une nouvelle maladie à virus de la canne à sucre à Maurice. [2]

20th July — J. A. LALOUETTE. Quelques réflexions sur le "breeding" et la sélection de la canne à sucre. [2]

2nd August — D.A. JAMES (Department of Zoology, University of Arkansas). How migratory birds find their way. [3]

14th September — P.Y. CHAN. Some physical aspects of soils in relation to irrigation. [2]

6th October — M.S. DHOTY (Professor of Botany, University of Hawaii). Reefs of Hawaii, and tropical seaweed agronomics. [3]

26th October — C. RICAUD et S. FELIX. Le contrôle des maladies de l'arachide. [2]

20th-27th Nov. — XXe Congrès, Comité de Collaboration Agricole, Maurice-Réunion-Madagascar.

26th November — J. CHAMPION (Chef du Service chargé de la culture de la banane à l'Institut Français des Recherches Fruitières Outre-Mer). Les techniques agronomiques en culture intensive du bananier et les possibilités d'adaptation aux conditions de l'Ile Maurice. [2]

6th December — G. HUGHES (Oceanographic Research Centre of Durban). Sea turtles. [3]

8th-15th Dec. — WORLD METEOROLOGICAL ORGANIZATION — Meetings of Experts on Tropical Cyclones in the South West Indian Ocean.

21st December — R. ANTOINE. Les variétés de canne à sucre. [2]

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1. Meeting under the auspices of the *Société de Technologie Agricole et Sucrière de l'Ile Maurice*.

2. Talks specially prepared for Extension Officers of the Agricultural Services of the Ministry of Agriculture and Natural Resources, and for Field Staff of the Sugar Estates.

3. Meeting under the auspices of the Royal Society of Arts & Sciences of Mauritius.

STATISTICAL TABLES*

* *Grateful acknowledgment is made to the Secretary, Mauritius Chamber of Agriculture, for providing the necessary data to compile Tables I to V.*

WEIGHTS AND MEASURES

(S.I. units are adopted throughout this report)

1 metric ton	=	1000 kilogrammes (kg) 1 Megagramme (Mg) 1 tonne
1 pound (lb)	=	.454 kg
1 kilogram	=	2.205 lb
1 inch	=	25.4 millimetres (mm)
1 millimetre	=	3.94 hundredths of an inch
1 mile	=	1.61 kilometres (km)
1 kilometre	=	.621 mile
1 Imperial gallon	=	4.55 litres (l)
1 cu ft	=	.0283 cu metre (m^3) or 28.32 litres (l)
1 cu metre	=	35.31 cu ft
1 hectare (ha)	=	2.37 arpents
1 arpent	=	.422 hectare
1 lb per arpent	=	1.075 kg per hectare (kg ha^{-1})
1 kg ha^{-1}	=	.931 lb per arpent
1 joule	=	1 kg m^2s^{-2}

Table I. Area under sugar cane, 1967 - 1971
(in thousand ha)

Year	Area under cane Island	Area reaped					
		Island	West	North	East	South	Centre
1967	86.64	81.10	5.19	21.21	18.33	25.97	10.40
1968	85.67	80.07	5.21	21.34	17.85	25.48	10.19
1969	86.35	79.50	5.26	21.14	17.94	25.19	9.97
1970	86.52	80.38	5.25	21.62	19.76	23.69	10.06
1971	86.60	79.88	5.24	21.13	19.68	23.59	10.24

Table II. Sugar production, 1967 - 1971
(in thousand tonnes)

Crop Year	No. of factories operating	Av. Pol.	Island	West	North	East	South	Centre
1967	23	98.8	638.3	50.4	159.3	137.3	206.2	85.1
1968	23	98.8	596.5	49.5	161.3	117.8	192.1	75.8
1969	22	98.7	668.7	48.7	168.6	155.4	205.5	90.5
1970	21	98.8	576.2	47.0	158.1	125.3	184.8	61.0
1971*	21	98.8	621.1	44.3	121.4	155.2	209.8	90.4

* *Provisional figures*

Table III. Yield of cane, 1967 - 1971
(in tonnes/ha)

SECTORS	1967	1968	1969	1970	1971
ISLAND					
Miller-Planters	83.7	73.9	85.6	74.7	79.9
Planters (inclusive of tenant-planters)	58.5	54.0	59.7	51.4	49.5
Average	*71.8*	*64.5*	*73.2*	*63.8*	*65.9*
WEST					
Miller-Planters	95.5	87.7	83.4	84.4	83.0
Planters (inclusive of tenant-planters)	70.6	71.8	61.6	59.7	51.2
Average	*83.0*	*79.9*	*72.5*	*73.5*	*68.7*
NORTH					
Miller-Planters	89.3	80.8	85.6	82.7	65.6
Planters (inclusive of tenant-planters)	58.3	57.8	59.5	55.2	39.1
Average	*69.4*	*65.9*	*69.0*	*65.2*	*48.8*
EAST					
Miller-Planters	85.3	69.9	96.5	72.8	84.4
Planters (inclusive of tenant-planters)	54.5	46.5	58.8	44.8	51.4
Average	*69.9*	*58.3*	*77.7*	*59.0*	*68.7*
SOUTH					
Miller-Planters	78.9	71.8	78.2	74.2	80.1
Planters (inclusive of tenant-planters)	59.7	52.6	58.3	55.2	60.4
Average	*72.8*	*65.6*	*71.3*	*68.0*	*73.9*
CENTRE					
Miller-Planters	82.2	71.6	90.3	62.8	87.9
Planters (inclusive of tenant-planters)	57.6	49.8	64.5	42.9	56.9
Average	*71.6*	*62.3*	*79.4*	*54.3*	*75.1*

Table IV. Average sucrose % cane, 1967-1971

Crop Year	Island	West	North	East	South	Centre
1967	12.46	13.27	12.34	12.15	12.45	12.79
1968	13.10	13.49	13.02	12.81	13.17	13.31
1969	13.01	14.31	13.23	12.63	12.94	12.82
1970	12.86	13.81	12.92	12.45	12.96	12.62
1971*	13.41	14.00	13.52	13.06	13.61	13.14

* *Provisional figures*

Table V. Yield of sugar, 1967-1971

A = Tonnes sucrose/ha

B = Tonnes sugar manufactured 98.5° Pol/ha

Crop Year	Island		West		North		East		South		Centre	
	A	B	A	B	A	B	A	B	A	B	A	B
1967	8.95	7.91	11.01	9.74	8.56	7.54	8.49	7.50	9.06	7.99	9.16	8.21
1968	8.45	7.48	10.78	9.53	8.58	7.58	7.47	6.62	8.64	7.62	8.29	7.47
1969	9.52	8.43	10.37	9.28	9.13	7.98	9.81	8.69	9.23	8.17	10.18	9.11
1970	8.20	7.19	10.15	8.97	8.42	7.32	7.35	6.37	8.81	7.80	6.85	6.08
1971*	8.84	7.81	9.62	8.48	6.60	5.74	8.97	7.93	10.06	8.91	9.87	8.85

* *Provisional figures*

Table VI. Monthly rainfall (in mm.), 1967 - 1971

(average over whole sugar cane area)

Crop Year	GROWTH PERIOD (deficient months in italics)								Nov-June (sum of monthly deficits)	MATURATION PERIOD (excess months in italics)				July-Oct. (sum of monthly excesses)
	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE		JULY	AUG.	SEPT.	OCT.	
Normals 1875-1949	**96**	**180**	**280**	**281**	**307**	**241**	**176**	**126**	**435**	**117**	**105**	**74**	**71**	**65**
Extremes	13	44	68	66	85	37	41	25	65	41	15	18	9	0
to date	335	1138	825	915	990	701	544	419	820	260	318	205	250	359
1967	*83*	314	383	*97*	310	*233*	*117*	*106*	419	*233*	*145*	72	*166*	250
1968	227	258	*78*	531	406	*87*	*138*	*100*	420	*133*	86	*110*	36	53
1969	*86*	*108*	*76*	*206*	*201*	*275*	*148*	*71*	551	*183*	*108*	51	9	69
1970	*30*	350	401	*188*	567	*102*	*109*	141	365	*124*	*123*	49	37	25
1971	*47*	*67*	*182*	296	*121*	273	195	*85*	585	112	79	22	42	0

Table VII. Monthly air temperatures (°C), 1967 - 1971

(mean maximum & minimum recorded at Plaisance Airport)

YEAR	NOV.		DEC.		JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.	
	M	m	M	m	M	m	M	m	M	m	M	m	M	m	M	m	M	m	M	m	M	m	M	m
Normals 1954-68	**27.3**	**19.5**	**28.6**	**21.3**	**29.0**	**22.3**	**29.3**	**22.5**	**28.8**	**22.3**	**27.8**	**21.0**	**26.0**	**19.3**	**24.7**	**17.8**	**23.8**	**17.8**	**23.7**	**17.2**	**24.5**	**17.4**	**25.6**	**18.3**
1967	27.6	19.5	29.1	22.0	29.2	23.0	29.6	22.8	29.8	22.6	28.9	21.6	23.6	20.1	24.5	18.7	23.8	17.7	23.2	17.7	24.0	17.6	24.7	18.2
1968	26.8	20.1	28.5	21.3	28.0	21.6	28.7	22.7	28.0	22.5	27.7	20.3	25.9	17.2	25.5	17.5	23.9	17.8	23.8	17.1	24.5	17.2	25.6	18.2
1969	27.2	19.4	28.7	21.1	30.1	22.7	29.3	22.3	30.4	22.8	28.6	22.3	27.4	20.9	25.1	18.2	24.1	18.4	23.4	17.4	24.7	18.0	26.8	19.6
1970	29.0	21.2	29.5	22.4	29.9	23.6	30.3	23.8	29.2	23.3	27.8	21.4	26.0	20.1	24.7	18.8	23.9	18.2	23.6	17.5	24.7	18.6	26.4	18.2
1971	27.3	20.3	29.0	21.3	30.3	22.7	28.8	22.7	28.7	21.5	28.0	22.1	26.7	19.7	24.6	18.1	24.0	18.4	23.6	16.8	24.6	17.1	25.4	18.7

Table VIII. Highest wind speed (km/hr), 1967-1971

(*average over Mauritius*)

Crop Year	1960	1967	1968	1969	1970	1971
November	31	23	31	27	26	29
December	24	26	31	31	24	34
January	**85**	**63**	39	29	43	32
February	**119**	23	43	35	**52**	43
March	24	19	40	19	**72**	26
April	24	19	23	23	32	26
May	27	34	26	29	31	27
June	27	32	29	27	34	32
July	24	32	32	29	37	41
August	26	35	34	31	34	28
September	32	27	34	32	31	29
October	29	37	29	26	24	34

NOTE: Cyclonic winds over 50 km/hr indicated in bold characters

Table IX. Highest wind speed (km/hr), cyclone years

Cyclone Years		West	North	East	South	Centre
March	1958	55	47	35	56	50
January	1960 *Alix*	97	77	69	97	—
February	1960 *Carol*	134	132	126	119	89
December	1961 *Beryl*	79	72	53	82	64
February	1962 *Jenny*	103	119	79	93	87
January	1964 *Danielle*	77	98	89	130	85
February	1964 *Gisèle*	60	53	42	68	52
January	1966 *Denise*	85	84	56	71	64
January	1967 *Gilberte*	53	61	66	72	60
February	1968 *Ida*	53	48	32	40	45
March	1968 *Monica*	39	27	50	50	32
February	1970 *Jane*	56	56	43	58	48
March	1970 *Louise*	63	74	84	77	61

Table X. Cane Varieties, 1964 - 1971

(*% area cultivated on estate lands*)

	B 3337 (*1953*)	B 37172 (*1953*)	B 34104 (*1955*)	Ebène 1/37 (*1951*)	Ebène 50/47 (*1962*)	M 134/32 (*1937*)	M 147/44 (*1955*)	M 31/45 (*1955*)	M 202/46 (*1959*)	M 93/48 (*1959*)	M 253/48 (*1961*)	M 442/51 (*1964*)	M 99/48 (*1965*)	M 409/51 (*1966*)	M 13/53 (*1966*)	M 13/56 (*1966*)	M 377/56 (*1966*)	M 351/57 (*1970*)	S 17 (*1970*)	M 124/59 (*1971*)	M 438/59 (*1971*)
1964	6	11	2	15	5	6	31	3	8	9	2	—	—	—	—	—	—	—	—	—	—
1965	5	9	2	11	6	5	29	4	11	12	2	2	—	—	—	—	—	—	—	—	—
1966	4	8	2	9	6	3	26	4	13	16	2	5	—	—	—	—	—	—	—	—	—
1967	3	6	1	6	6	2	23	5	14	17	2	7	1	—	—	—	—	—	—	—	—
1968	2	5	1	4	5	2	19	6	14	19	2	9	1	1	1	3	1	—	—	—	—
1969	1	3	1	2	4	1	15	6	15	21	2	10	1	1	1	6	3	—	—	—	—
1970	0	2	1	1	3	1	12	6	12	21	2	10	1	1	1	8	8	2	4	—	—
1971	0	1	0	1	2	1	7	6	11	20	1	10	1	1	1	11	8	4	10	—	—

NOTE: Year of approval by Cane Release Committee in italics

Table XI. Cane varieties on miller-planters' land, 1967 - 1971

(% *annual plantations*)

Years / Varieties	Island					West					North					East					South					Centre				
	1967	1968	1969	1970	1971	1967	1968	1969	1970	1971	1967	1968	1969	1970	1971	1967	1968	1969	1970	1971	1967	1968	1969	1970	1971	1967	1968	1969	1970	1971
M 147/44 ...	2.9	0.1	—	—	—	20.1	0.3	—	—	—	5.8	0.4	—	—	—	2.9	—	—	—	—	0.1	0.1	—	—	—	—	—	—	—	—
M 31/45 ...	6.3	7.4	1.9	2.0	2.0	0.4	0.5	0.2	0.3	0.8	1.6	0.3	0.8	0.5	1.8	12.2	22.4	4.8	7.2	5.2	8.6	5.0	1.6	0.4	0.8	0.8	2.2	—	0.3	0.4
M 202/46 ...	8.6	7.7	1.3	0.9	0.7	33.6	22.2	0.2	—	—	4.8	1.7	0.1	—	—	9.2	4.8	0.2	0.2	—	9.7	12.8	3.2	2.1	1.8	1.7	0.8	—	—	—
M 93/48 ...	20.2	23.7	13.3	12.3	9.9	1.4	—	—	—	—	4.6	0.7	1.7	—	—	22.7	26.0	5.3	3.9	2.7	18.9	17.4	9.9	13.2	11.5	43.3	70.3	51.4	41.4	40.7
M 99/48 ...	3.1	0.1	—	—	—	—	1.1	—	—	—	0.3	—	—	—	—	5.1	—	—	—	—	1.8	—	—	—	—	6.6	—	—	—	—
M 253/48 ...	0.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.7	—	—	—	—	0.2	—	—	—	—	0.2	—	—	—	—
M 409/51 ...	4.9	0.9	—	—	—	5.3	—	—	—	—	1.7	0.3	—	—	—	5.1	—	—	—	—	7.3	0.9	—	—	—	3.3	3.4	—	—	—
M 442/51 ...	24.4	11.7	4.1	0.4	0.5	20.8	15.9	1.6	—	—	56.8	36.8	6.5	0.4	1.0	26.7	9.2	7.1	0.4	0.5	16.8	5.4	3.1	0.8	0.5	1.0	1.6	—	0.1	—
M 13/53 ...	3.7	3.0	0.4	0.2	—	3.7	3.7	—	—	—	8.4	9.9	0.8	1.0	—	3.7	3.5	—	—	—	2.4	0.7	—	—	—	0.8	0.1	1.3	0.1	—
M 13/56 ...	7.9	22.9	24.8	16.6	25.8	4.6	8.3	21.2	13.4	19.1	14.6	41.4	58.7	30.5	56.9	4.2	16.9	21.5	17.0	19.1	10.5	24.7	18.7	16.1	24.6	1.6	10.2	7.2	3.8	—
M 377/56 ...	0.8	9.8	32.6	20.7	—	2.8	38.1	35.2	8.1	—	0.6	6.4	25.2	39.2	—	0.6	9.7	38.2	17.0	—	1.0	10.0	34.3	19.1	—	0.2	4.5	27.4	15.9	—
M 351/57 ...	—	—	9.9	6.4	8.7	6.4	—	4.3	4.8	2.0	—	—	—	1.4	2.2	0.4	—	13.1	2.5	6.2	3.1	—	15.8	10.3	10.3	2.4	—	4.3	8.2	23.3
Ebène 1/37 ...	0.2	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.7	0.3	—	—	—	—	—	—	—	—
Ebène 50/47	0.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.7	—	—	—	—	1.0	—	—	—	—
N Co 376 ...	0.8	1.9	0.9	0.4	0.1	—	0.3	1.2	—	—	—	0.1	—	—	—	0.4	0.1	—	—	—	1.9	4.3	1.2	0.9	0.3	—	0.8	2.6	—	—
S 17 ...	—	—	8.3	37.3	48.2	—	—	27.6	69.8	67.1	—	—	3.5	25.2	37.2	—	—	7.8	49.5	61.7	—	—	9.9	33.9	47.0	—	—	3.9	27.0	29.8
M 124/59 —	—	—	—	—	1.7	—	—	—	—	2.7	—	—	—	—	—	—	—	—	—	1.0	—	—	—	—	1.9	—	—	—	—	0.4
Other varieties	15.5	10.7	2.5	2.8	2.4	0.9	9.6	8.5	3.6	8.3	0.8	2.0	2.7	1.8	0.9	6.1	7.4	2.0	2.3	3.6	16.3	18.4	2.3	3.2	1.3	37.1	6.1	1.9	3.2	5.4
Total area planted ha	5,072	5,480	5,901	6,018	6,317	273	270	311	374	521	994	970	1,047	965	1,143	1,212	1,204	1,423	1,399	1,445	1,723	2,179	2,199	2,385	2,466	871	858	922	895	742

Table XII. Area harvested and yields, 1971 crop

A = area in ha

B = yields, tonnes/ha

	Island		West		North		East		South		Centre	
	A	B	A	B	A	B	A	B	A	B	A	B
I. Miller-Planters												
(a) Virgin canes												
(i) Grande Saison*	3536	94.8	248	103.2	777	75.6	753	87.9	1155	103.7	603	107.9
(ii) Petite Saison**	1831	84.0	98	83.7	92	71.8	509	85.9	959	83.5	173	87.4
(b) Ratoons												
1st ratoon	6014	90.0	347	91.0	1064	77.0	1463	93.6	2222	90.2	918	98.4
2nd ,,	5690	82.6	298	81.0	1070	67.1	1294	89.5	2173	82.4	855	92.9
3rd ,,	4973	77.5	300	81.5	1054	61.9	1224	84.4	1683	77.7	712	86.6
4th ,,	4617	73.8	270	76.5	950	58.3	1075	82.8	1663	74.3	659	79.3
5th ,,	4967	73.7	348	83.1	917	59.3	1042	78.6	1898	72.7	762	83.0
6th ,,	4470	74.0	236	77.4	794	64.2	1232	79.4	1607	72.1	601	79.8
Older ratoons	6902	73.8	759	77.5	1025	62.8	1639	79.0	2724	73.8	755	73.3
I. Total Miller-Planters	43,000	79.9	2904	83.0	7743	65.6	10231	84.4	16084	80.1	6038	87.9
II. Total Owner-Planters	33916	49.8	2283	51.4	13383	39.1	8287	53.8	5866	63.0	4097	57.1
III. Total Tenant-Planters	2961	44.6	53	33.2	10	40.5	1159	38.6	1636	51.0	103	46.2
	79877	65.9	5240	68.7	21136	48.8	19677	68.7	23586	73.9	10238	76.3

* *Planted from January to June*

** *Planted from July to December*

Table XIII. Evolution of cane quality, 1971 crop
(*sucrose % cane*)

Week Ending	Island	West	North	East	South	Centre
17th July	11.99	—	—	12.12	12.11	11.66
24th ,,	12.04	—	—	12.09	12.17	11.75
31st ,,	12.41	13.56	12.02	12.13	12.60	11.92
7th August	12.55	13.29	12.17	12.46	12.68	12.41
14th ,,	12.55	13.56	12.08	12.49	12.74	12.53
21st ,,	12.82	13.81	12.43	12.69	12.96	12.86
28th ,,	12.97	13.66	12.60	12.76	13.26	13.00
4th September	13.15	13.96	12.88	12.89	13.42	13.03
11th ,,	13.41	14.18	13.10	13.02	13.81	13.26
18th ,,	13.63	14.10	13.50	13.30	13.92	12.94
25th ,,	13.88	14.30	13.72	13.52	14.30	13.58
2nd October	14.17	14.85	14.04	13.83	14.52	13.93
9th ,,	14.25	14.48	14.14	13.88	14.66	13.93
16th ,,	14.37	14.85	14.79	14.07	14.56	13.93
23rd ,,	14.35	14.55	14.57	14.01	14.57	13.90
30th ,,	14.54	14.91	14.78	14.22	14.67	14.13
6th November	14.61	14.88	14.86	14.44	14.64	14.24
13th ,,	14.54	15.04	14.73	14.12	14.78	14.23
20th ,,	14.15	14.13	14.41	13.91	14.23	13.99
27th ,,	13.73	13.67	13.77	13.57	13.82	13.72
4th December	13.32	12.95	13.31	13.08	13.48	13.71
11th ,,	12.90	12.68	12.23	12.86	12.91	13.33

Table XIV. Comparative mid-harvest dates, 1967-1971

A = mid-harvest date

B = difference in age (days) of successive crops

Crop Years	Island		West		North		East		South		Centre	
	A	B	A	B	A	B	A	B	A	B	A	B
1967	23/9	+ 7	23/9	— 3	30/9	+10	23/9	+ 7	20/9	+ 6	17/9	+ 9
1968	2/9	—21	4/9	—19	10/9	—20	26/8	—28	1/9	—19	30/8	—19
1969	15/9	+13	23/9	+19	21/9	+11	10/9	+15	12/9	+11	14/9	+15
1970	8/9	— 7	16/9	— 7	14/9	— 7	5/9	— 5	12/9	—	24/8	—21
1971	20/10	+42	29/9	+13	30/9	+16	15/10	+41	23/10	+ 42	19/10	+56

Average mid-harvest dates

	Island	West	North	East	South	Centre
1967-1971	*20/9*	*19/9*	*21/9*	*16/9*	*20/9*	*16/9*

Table XV. Summary of chemical control data 1971

(i) CANE CRUSHED AND SUGAR PRODUCED

		Médine	Solitude	Beau Plan	The Mount	Belle Vue	St Antoine	Mon Loisir	Constance	Union Flacq	Beau Champ	Riche en Eau	Mon Trésor	Savannah	Rose Belle	Britannia	Union St. Aubin	St. Félix	Bel Ombre	Réunion	Highlands	Mon Désert	Totals & Averages
CRUSHING PERIOD	From	24/7	30/7	6/8	24/7	2/8	7/8	3/8	23/7	25/6	30/6	22/7	7/7	8/7	9/7	1/7	19/7	19/7	26/7	30/6	9/7	12/7	—
	To	8/12	23/11	19/11	10/12	19/11	7/12	30/11	27/11	8/12	8/12	4/12	3/12	8/12	15/12	7/12	20/12	4/12	18/12	26/11	24/11	11/12	—
	No. of crushing days	107	79	71	105	89	92	87	106	138	127	106	119	122	122	131	116	111	117	114	100	116	111
	Net crushing hours per day	20.62	21.28	21.72	20.79	18.17	21.84	20.43	20.05	21.58	21.14	21.15	18.65	20.25	20.76	21.97	21.30	20.15	19.96	19.30	21.51	22.68	20.39
	Hours stoppages per day	0.40	0.27	0.93	0.61	0.74	1.33	1.05	0.52	1.27	0.32	0.38	1.33	0.16	1.24	0.30	0.94	0.50	2.09	0.28	0.51	0.28	0.74
	Overall Time Efficiency	85.9	88.7	90.5	86.6	75.7	91.0	85.1	83.5	89.9	89.4	88.1	77.7	84.4	86.5	91.5	88.8	84.0	83.2	80.4	89.6	94.5	85.0
	Mechanical Efficiency	98.1	98.7	95.9	97.2	96.1	94.3	95.1	97.5	94.4	98.5	98.2	93.3	99.2	94.4	98.7	95.8	97.6	90.5	98.6	97.7	98.8	96.5
CANE CRUSHED (Tonnes)	Factory	240,719	36,062	42,083	124,148	86,429	86,337	134,581	116,610	467,955	277,898	215,762	180,670	196,475	165,208	161,356	252,861	52,927	71,542	151,189	128,992	250,383	3,440,187
	Planters	119,167	98,291	78,910	51,572	98,845	112,958	83,602	100,411	261,309	122,978	33,886	37,881	79,815	67,953	60,283	8,215	75,151	85,873	59,106	73,017	105,950	1,815,173
	Total	359,886	134,353	120,993	175,720	185,274	199,295	218,183	217,021	729,264	400,876	249,648	218,551	276,290	233,161	221,639	261,076	128,078	157,415	210,295	202,009	356,333	5,255,360
	Factory % Total	66.9	26.8	34.8	70.7	46.7	43.3	61.7	53.7	64.2	69.3	86.4	82.7	71.1	70.9	72.8	96.9	41.3	45.4	71.8	63.9	70.3	65.5
	Per day	3,363	1,712	1,705	1,674	2,082	2,166	2,508	2,047	5,285	3,157	2,355	1,837	2,265	1,911	1,692	2,251	1,154	1,345	1,845	2,020	3,072	2,259
	Per hour actual crushing	163.1	80.4	79.0	80.5	114.6	99.2	122.8	102.5	244.9	149.3	111.4	98.5	111.8	92.1	77.0	105.7	57.3	67.4	95.6	93.9	135.5	108.7
PERCENTAGE VARIETIES CRUSHED (Factory)	M 93/48	0.9	0.7	2.9	20.7	1.6	4.4	3.9	2.1	31.6	12.3	7.3	9.7	12.8	38.3	42.8	21.3	12.7	0.6	40.6	42.5	76.2	21.0
	M 202/46	23.1	21.5	17.2	13.6	9.9	7.0	2.9	8.8	5.7	18.5	12.5	15.9	19.5	36.1	10.6	9.5	3.2	10.9	9.6	0.7	0.4	12.3
	M 442/51	10.2	13.1	19.0	18.1	20.0	23.2	36.6	17.4	10.5	8.3	11.4	10.1	6.8	0.5	1.5	7.8	10.6	1.38	4.4	—	0.9	10.6
	M 13/56	5.5	18.6	14.4	19.8	16.5	24.3	21.4	16.1	4.3	8.1	10.8	15.0	11.5	1.6	2.5	9.2	12.1	16.0	4.7	3.2	2.4	9.8
	M 377/56	9.5	16.6	13.5	9.6	11.1	8.1	5.0	16.4	10.7	5.9	8.6	12.1	9.5	7.7	7.5	8.8	8.9	11.5	5.2	9.1	7.6	9.2
	M 147/44	16.2	7.2	13.4	6.7	24.5	21.6	18.1	18.6	3.9	10.8	6.1	7.0	5.1	—	1.1	5.1	8.5	13.6	3.3	—	0.1	8.2
	M 31/45	0.6	—	4.3	2.2	0.3	2.7	4.0	7.6	11.8	17.0	6.4	5.9	4.6	2.6	6.1	6.9	14.1	3.6	5.9	—	—	6.0
	S 17	11.8	3.1	3.0	0.8	5.9	3.2	2.7	3.7	8.2	6.3	8.5	4.4	9.0	0.6	3.5	5.7	4.1	13.9	2.7	6.1	4.0	5.8
	M 351/57	2.1	0.4	—	0.8	—	0.2	—	—	3.5	1.8	9.0	1.7	3.7	5.0	6.8	5.1	4.3	0.8	4.0	0.4	2.4	2.9
	E 50/47	—	—	—	—	—	—	—	1.4	0.2	2.5	—	2.8	0.8	0.8	—	5.9	1.5	2.6	—	9.4	0.3	1.4
	M 253/48	6.3	—	—	—	—	—	—	2.0	0.3	2.5	1.7	1.3	1.3	—	—	0.5	—	—	2.2	—	—	1.2
	M 13/53	1.6	4.6	7.7	5.4	3.2	1.3	1.8	—	0.3	2.4	—	—	0.7	—	—	—	—	4.1	6.6	—	—	1.1
	M 99/48	—	—	—	—	—	—	—	—	2.8	0.5	1.3	0.7	—	0.7	4.9	0.8	—	—	—	—	—	1.1
	B 37172	3.3	1.3	—	—	1.0	2.4	—	—	—	0.9	2.3	0.9	1.4	—	—	1.4	4.5	3.3	—	—	—	1.0
	Other varieties	8.9	12.9	4.6	2.3	6.0	1.6	3.6	5.9	6.2	2.2	14.1	12.5	13.3	6.1	12.7	12.0	15.5	5.3	10.8	28.6	5.7	8.4
SUGAR PRODUCED (Tonnes)	Raw Sugar	44,326	15,307	14,533	20,753	21,574	13,003	26,815	25,464	77,616	35,238	31,043	27,798	34,438	27,457	25,909	30,300	15,037	10,333	23,574	24,388	42,420	587,385
	White Sugar	—	—	—	—	—	9,466	—	—	7,359	9,446	—	—	—	—	—	—	—	7,494	—	—	—	33,706
	Total Sugar	44,326	15,307	14,533	20,753	21,574	22,469	26,815	25,464	84,975	44,684	31,043	27,798	34,438	27,457	25,909	30,300	15,037	17,827	23,574	24,388	42,420	621,091
	Total Sugar at 96° Pol.	45,554	15,674	14,926	21,363	22,159	23,206	27,515	26,186	87,292	46,035	32,012	28,597	35,428	28,328	26,615	31,227	15,408	18,398	24,233	25,099	43,651	638,906

Table XV. Summary of chemical control data 1971

(ii) CANE, BAGASSE AND JUICES

		Médine	Solitude	Beau Plan	The Mount	Belle Vue	St Antoine	Mon Loisir	Constance	Union Flacq	Beau Champ	Riche en Eau	Mon Trésor	Savannah	Rose Belle	Britannia	Union St. Aubin	St. Félix	Bel Ombre	Réunion	Highlands	Mon Désert	Totals & Averages
CANE/SUGAR RATIO	Tonnes cane per tonne sugar made	8.12	8.78	8.33	8.47	8.59	8.87	8.14	8.52	8.58	8.97	8.04	7.86	8.02	8.49	8.55	8.62	8.52	8.83	8.92	8.28	8.40	8.46
	Tonnes cane per tonne sugar made @ 96° Pol.	7.90	8.57	8.11	8.23	8.36	8.59	7.93	8.29	8.35	8.71	7.80	7.64	7.80	8.23	8.33	8.36	8.31	8.56	8.68	8.05	8.16	8.23
	Sucrose per cent	14.00	13.11	13.47	13.17	13.43	13.72	13.95	13.40	13.02	12.97	13.91	14.42	14.09	13.44	13.04	13.08	13.32	13.20	12.78	13.36	13.25	13.41
	Fibre per cent	13.53	14.98	15.15	14.23	15 41	14.87	13.24	14.56	13.18	13.32	12.92	13.00	12 82	12.60	11.40	12.03	13.08	13.39	12.87	11.70	12.00	13.20
BAGASSE	Pol. per cent	1.99	1.95	1.64	1.73	2.16	2.45	2.04	2.05	1.98	2.48	2.03	2.48	2.46	2.43	2.14	2.44	2.23	2.16	2.15	1.49	1.87	2.12
	Moisture per cent	50.3	48.3	48.4	46.7	46.9	50.3	49.4	48.7	50.4	47.9	49.3	48.5	47.6	49.8	46.7	47.6	47.9	49.8	50.9	49.8	50.3	49.1
	Fibre per cent	47.0	49.0	49.3	51.1	50.3	46.6	47.8	48.5	47.0	48.7	48.2	48.4	49.3	47.1	50.5	49.2	49.2	47.5	46.2	48.2	47.3	48.1
	Weight per cent cane	28.80	30.57	30.73	27.88	30.63	31.94	27.71	30.05	28.03	27.35	26.82	26.86	25.99	26.75	22.58	24.45	26.59	28.22	27.84	24.29	25.37	27.42
FIRST EXPRESSED JUICE	Brix (B_1)*	19.25	19.59	19.97	18.81	19.98	20.24	20.05	19.15	18.09	18.67	19.18	19.86	19.15	18.13	17.91	18.30	17.94	18.57	17.64	17.89	17.81	18.87
	Gravity purity	88.9	87.5	88.4	90.2	89.2	88.8	89.9	88.6	90.2	89.0	89.7	90.9	90.9	90.7	90.9	89.6	88.5	89.8	89.9	90.5	90.8	89.7
	Reducing sugars/sucrose ratio	3.1	3.5	3.2	3.0	2.2	3.7	2.7	4.1	3.4	3.3	2.5	2.5	2.6	3.5	3.7	3.1	2.8	2.7	2.7	2.8	2.9	3.0
LAST EXPRESSED JUICE	Brix*	1 77	3.54	2.01	3.12	3.96	3.41	2.53	2.66	4.00	3.72	2.46	2.75	3.76	3.11	2.92	2.88	3.03	3.08	2.40	1.89	2.20	2.91
	Apparent purity	72.8	72.3	72.0	75.3	76.3	76.8	72.0	73.0	77.6	73.7	78.9	78.7	80.0	76.8	76.0	78.1	75.2	78.0	74.5	73.5	76.1	75.6
MIXED JUICE	Weight per cent on cane	100.0	94.4	104.3	100.9	103.9	102.2	106.3	101.3	93.9	99.9	112.0	103.1	103.3	104.0	101.9	104.2	101.8	99.6	100.7	102.0	102.3	101.3
	Brix*	15.27	15.44	14.40	14.39	14.25	14.62	14.20	14.52	15.02	14.17	13.56	14.96	14.56	13.73	13.82	13.66	14.30	14.40	13.70	14.36	13.94	14.38
	Gravity purity	88.0	86.1	86.3	87.4	86.2	86.5	88.6	86.9	88.3	86.9	88.0	89.1	89.4	89.6	89.2	87.7	87.3	87.7	88.2	89.0	89.6	88.1
	Reducing sugars/sucrose ratio	3.5	3.8	4.0	3.8	3.2	4.5	3.7	5.0	4.9	3.8	3.2	2.9	3.3	3.9	4.5	3.9	3.2	3.3	3.1	3.1	3.1	3.8
	Gty. Pty. drop from 1st expressed juice	0.9	1.4	2.1	2.8	3.0	2.3	1.3	1.7	1.9	2.1	1.7	1.8	1.5	1.1	1.7	1.9	1.2	2.1	1.7	1.5	1.2	1.6
ABSOLUTE JUICE	Brix (B_A)	18.57	18.09	18.53	17.67	18.52	18.75	18.31	18.20	17.07	17.39	18,23	18.71	18.17	17.30	16.61	17.06	17.66	17.47	16.76	17.10	16.91	17.66
	B_A/B_1	0.97	0.92	0.93	0.94	0.93	0.93	0.91	0.95	0,94	0.93	0,95	0.94	0.95	0.95	0.93	0.93	0.98	0.94	0.95	0.96	0.95	0.94
	Gravity purity	87.2	85.3	85.7	86.9	85.7	85.9	87.8	86.1	87.8	86.1	87,6	88.5	88.9	88.9	88.6	87.1	86.7	87.2	87.5	88.5	89.0	87.5
CLARIFIED JUICE	Brix*	15.09	15.96	14.08	13.97	14.00	13.83	13.88	14.62	15.31	13.80	13.55	14.58	13.99	12.89	13.39	13.75	14.20	14.31	14.02	14.18	13.85	14.15
	Gravity purity	—	86.7	86.7	88.1	86.8	87.4	—	86.9	89.4	88.2	88.7	89.3	90.1	—	89.6	—	88.1	87.8	88.8	89.2	89.5	88.3
	Reducing sugars/sucrose ratio	3.7	3.8	4.0	3.8	2.8	4.4	—	4 8	3.9	3.9	2.9	2.7	3.2	3.5	4.6	—	3.3	3.2	3.0	3.0	3.2	3.6

* *Refractometric Brix*

Table XV. Summary of chemical control data 1971

(iii) FILTER CAKE, SYRUP, pH, FINAL MOLASSES, SUGAR

		Médine	Solitude	Beau Plan	The Mount	Belle Vue	St. Antoine	Mon Loisir	Constance	Union Flacq	Beau Champ	Riche en Eau	Mon Trésor	Savannah	Rose Belle	Britannia	Union St. Aubin	St. Félix	Bel Ombre	Réunion	Highlands	Mon Désert	Totals & Averages
FILTER CAKE	Pol. per cent	1.18	1.03	1.34	1.68	0.56	0.97	0.97	0.82	04.5	1.57	0.82	2.04	0.71	2.30	2.11	1.34	8.32	4.37	8.20	2.21	2.43	1.70
	Weight per cent cane	3.69	3.14	5.20	3.69	3.75	2.88	3.22	2.50	28.6	3.22	4.69	3.83	2.37	2.04	3.74	2.81	1.66	3.34	2.07	2.48	4.80	3.24
SYRUP	Brix*	57.2	59.8	60.3	60.6	57.2	65.6	61.5	62.2	62.6	56.1	65.6	62.6	61.0	65.7	64.9	58.5	56.5	52.6	57.8	60.5	64.6	60.6
	Gravity purity	—	86.1	86.5	88.2	87.5	87.3	—	87.0	88.9	87.6	88.6	89.5	90.3	—	89.2	—	88.1	87.9	88.4	88.9	89.4	88.2
	Reducing sugars/sucrose ratio	3.9	5.4	4.2	3.8	3.0	4.8	—	4.8	2.1	4.1	3.0	3.1	3.6	3.6	4.7	—	2.8	3.3	2.5	3.1	3.3	3.6
pH VALUES	Limed juice	8.0	8.1	8.4	7.5	8.4	—	—	—	8.2	—	8.1	—	7.9	8.0	8.0	—	—	7.7	8.3	8.1	7.9	8.0
	Clarified juice	7.2	7.0	7.1	6.9	7.2	7.1	7.1	7.2	7.4	7.2	7.7	7.4	7.4	7.3	7.2	7.1	6.9	6.7	7.2	7.4	7.4	7.2
	Filter press juice	—	—	9.3	—	6.9	—	6.9	6.9	9.0	7.3	7.1	7.2	7.1	7.5	—	6.2	—	—	7.2	7.5	7.0	7.4
	Syrup	6.3	—	6.9	6.4	6.6	6.4	6.8	6.5	6.8	6.7	6.9	6.9	6.8	6.8	7.1	6.5	—	6.7	6.7	7.1	7.3	6.7
FINAL MOLASSES	Brix**	87.8	81.9	90.1	87.3	85.0	88.6	88.8	85.5	87.8	84.3	90.2	88.6	89.8	90.7	87.0	88.7	87.2	85.6	85.7	87.9	84.1	87.1
	Sucrose per cent	34.87	29.93	31.32	30.58	31.19	35.48	35.18	31.60	34.50	32.90	33.64	34.42	34.27	34.52	33.90	33.46	33.60	33.77	33.91	33.83	31.26	33.43
	Reducing sugars per cent	16.84	12.95	15.82	15.03	11.56	16.09	16.71	18.06	16.50	16.77	13.18	15.13	14.60	18.39	17.40	16.16	14.90	12.82	13.25	13.18	14.63	15.53
	Total sugars per cent	51.71	42.88	47.14	45.61	42.75	51.57	51.89	49.66	51.00	49.67	46.82	49.55	48.87	52.91	51.30	49.62	48.50	46.59	47.16	47.01	45.89	48.96
	Gravity purity	39.7	36.5	34.7	35.0	36.7	40.0	39.6	36.9	39.3	39.0	37.3	38.8	38.2	38.1	39.0	37.7	38.5	39.4	39.6	38.5	37.2	38.4
	Reducing sugars/sucrose ratio	48.3	43.3	50.5	49.2	37.1	45.4	47.5	57.2	48.0	51.0	39.2	43.9	42.6	53.3	51.4	48.3	44.3	38.0	39.0	38.9	46.8	46.5
	Weight per cent cane @ 85° Brix	3.06	3.32	3.19	2.77	2.91	3.89	2.99	3.12	2.60	2.85	2.73	2.70	2.56	2.28	2.51	2.56	2.63	2.90	2.42	2.45	2.33	2.75
SUGAR MADE	White sugar recovered per cent cane	—	—	—	—	—	4.75	—	—	1.02	2.36	—	—	—	—	—	—	—	4.76	—	—	—	0.64
	Raw " " " " "	12.32	11.39	12.01	11.81	11.64	6.52	12.29	11.73	10.63	8.79	12.43	12.72	12.46	11.78	11.69	11.61	11.74	6.57	11.21	12.07	11.90	11.18
	Total " " " " "	12.32	11.39	12.01	11.81	11.64	11.27	12.29	11.73	11.65	11.15	12.43	12.72	12.46	11.78	11.69	11.61	11.74	11.33	11.21	12.07	11.90	11.82
	Average Pol. of sugars	98.659	98.301	98.599	98.821	98.605	99.149	98.507	98.724	98.618	98.902	98.997	98.758	98.759	99.046	98.616	98.936	98.374	99.078	98.685	98.799	98.786	98.754
	Total sucrose recovered per cent cane	12.15	11.20	11.84	11.67	11.48	11.18	12.11	11.58	11.49	11.02	12.31	12.56	12.31	11.66	11.53	11.48	11.55	11.22	11.06	11.93	11.76	11.67
	Moisture content of raw sugar per cent	0.329	0.468	0.341	0.380	0.415	0.399	0.371	0.371	0.402	0.364	0.290	0.329	0.357	0.316	0.375	0.299	0.512	0.299	0.356	0.328	0.323	0.360
	Dilution indicator	32.5	38.0	32.2	47.5	42.3	42.4	33.1	41.0	37.1	37.1	40.7	36.0	40.4	49.5	37.2	39.1	46.0	27.3	37.1	37.6	36.2	40.6

* *Refractometric Brix 1 : 5w/w*
** *Refractometric Brix 1 : 6w/w*

Table XV. Summary of chemical control data 1971

(iv) MASSECUITES

		Médine	Solitude	Beau Plan	The Mount	Belle Vue	St. Antoine	Mon Loisir	Constance	Union Flacq	Beau Champ	Riche en Eau	Mon Trésor	Savannah	Rose Belle	Britannia	Union St. Aubin	St. Félix	Bel Ombre	Réunion	Highlands	Mon Désert	Totals & Averages
MAGMA	Apparent purity	80.9	86.0	87.3	84.9	85.3	82.2	82.3	85.5	89.5	81.5	91.5	84.6	86.6	85.5	83.3	84.9	83.8	90.1	83.8	83.3	84.8	85.1
A-MASSECUITE	Brix*	91.7	92.0	91.1	92.8	90.6	89.5	92.8	92.4	93.4	92.1	91.2	92.1	91.6	92.3	93.0	92.9	91.7	90.9	92.0	92.2	91.5	92.1
	Apparent purity	87.0	82.8	85.3	85.3	87.4	84.8	80.9	79.7	80.6	81.4	88.1	88.2	83.9	89.5	83.7	80.2	81.6	86.1	84.4	83.4	84.3	83.5
	Apparent purity of A-molasses	70.3	58.3	67.3	61.2	69.5	69.4	58.5	56.3	57.1	58.4	68.7	66.2	65.5	66.5	57.1	55.6	58.3	71.6	63.8	59.6	66.0	62.1
	Drop in purity	16.7	24.5	18.0	24.1	17.9	15.4	22.4	23.4	23.5	23.0	19.4	22.0	18.4	23.0	26.6	24.6	23.3	14.5	20.6	23.8	18.3	21.4
	Crystal per cent Brix in massecuite	56.2	58.8	55.0	62.1	58.7	50.3	54.1	53.5	54.8	55.3	62.0	65.0	53.3	68.7	62.0	55.4	55.8	51.1	56.9	58.9	53.8	56.5
	Litres per ton Brix in mixed juice	774	950	810	902	660	1129	963	958	985	1319	690	631	966	794	1132	1159	1096	845	744	1173	1251	967
	A-Massecuite per cent total massecuite	55.2	73.6	59.9	79.4	51.1	59.7	61.1	79.5	83.4	82.6	54.9	48.8	62.4	60.6	83.1	81.3	80.6	56.4	62.9	83.9	75.6	69.7
B-MASSECUITE	Brix*	91.9	—	90.9	—	91.9	91.0	92.0	—	—	—	93.7	93.1	92.3	92.5	—	—	—	91.7	92.0	—	92.0	92.1
	Apparent purity	76.1	—	74.1	—	77.9	74.9	74.0	—	—	—	77.4	75.2	75.0	80.0	—	—	—	77.7	75.2	—	71.0	75.7
	Apparent purity of B-molasses	57.6	—	51.3	—	58.0	57.0	53.2	—	—	—	53.0	49.3	55.3	56.1	—	—	—	61.1	54.5	—	53.0	55.1
	Drop in purity	18.5	—	22.8	—	19.9	17.9	20.8	—	—	—	24.4	25.9	19.7	23.9	—	—	—	16.6	20.7	—	18.0	20.6
	Crystal per cent Brix in massecuite	43.6	—	46.8	—	47.4	41.6	44.4	—	—	—	51.9	51.0	44.1	54.4	—	—	—	42.7	45.5	—	38.3	45.9
	Litres per tonne Brix in mixed juice	363	—	300	—	421	455	388	—	—	—	306	415	380	292	—	—	—	364	234	—	221	184
	B-Massecuite per cent total massecuite	25.9	—	22.2	—	32.6	24.1	24.6	—	—	—	24.3	32.1	24.6	22.3	—	—	—	24.3	19.8	—	13.3	13.2
	Kg. Sugar per cubic metre of A&B massecuite	710	826	722	902	728	476	604	832	839	597	822	787	616	759	733	704	736	653	831	705	567	705
C-MASSECUITE	Brix*	93.5	94.3	93.4	95.4	95.4	95.0	94.6	94.5	97.1	94.7	95.7	95.3	95.2	93.6	94.3	93.8	93.4	93.4	94.4	95.0	96.1	94.9
	Apparent purity	62.2	60.4	59.2	61.1	59.5	60.0	59.2	58.5	59.0	59.4	61.6	60.4	58.4	63.2	62.0	60.4	62.0	63.8	59.4	61.9	58.2	60.3
	,, ,, of final molasses	35.9	33.7	30.4	33.0	37.3	38.4	38.2	33.4	33.9	36.2	33.7	34.5	38.2	33.0	34.7	33.3	34.5	37.4	36.2	35.4	33.9	35.1
	Drop in purity	26.3	26.7	28.8	28.1	22.2	21.6	21.0	25.1	25.1	23.2	27.9	25.9	20.2	30.2	27.3	27.1	27.5	26.4	23.2	26.5	24.3	25.2
	Crystal per cent Brix in massecuite	41.0	40.3	41.4	41.9	35.4	35.1	34.0	37.7	38.0	36.4	42.1	39.5	32.7	45.1	41.8	40.6	41.9	42.2	36.4	41.0	36.8	38.8
	Litres per tonne Brix in mixed juice	264	340	240	234	211	306	225	238	197	279	262	246	200	223	231	267	262	290	205	224	184	238
	C-Massecuite per cent total massecuite	14.3	26.4	17.9	20.6	16.3	16.2	14.3	20.5	16.6	17.4	20.8	19.1	13.0	17.1	16.9	18.7	19.4	19.3	17.3	16.1	11.1	17.1
TOTAL MASSECUITE	Litres per tonne Brix in mixed juice	1401	1290	1350	1136	1292	1890	1576	1196	1182	1598	1258	1292	1546	1309	1363	1426	1358	1499	1183	1397	1656	1388
	Litres per tonne sugar made	1735	1640	1690	1396	1641	2506	2550	1499	1430	2028	1536	1568	1866	1588	1640	1749	1683	1899	1456	1690	1984	1711

* *Refractometric Brix 1 : 6, w/w.*

Table XV. Summary of chemical control data 1971

(v) MILLING WORK, SUCROSE LOSSES AND BALANCE, RECOVERIES

		Médine	Solitude	Beau Plan	The Mount	Belle Vue	St. Antoine	Mon Loisir	Constance	Union Flacq	Beau Champ	Riche en Eau	Mon Trésor	Savannah	Rose Belle	Britannia	Union St. Aubin	St. Félix	Bel Ombre	Réunion	Highlands	Mon Désert	Totals & Averages
MILLING WORK	Imbibition water % cane	28.8	24.9	31.5	28.7	34.5	34.2	34.1	31.3	21.9	27.2	38.8	30.0	29.3	30.8	24.5	28.7	28.4	27.9	28.6	26.3	27.6	28.7
	Imbibition water % fibre	213	167	231	202	224	230	257	215	166	204	301	231	228	244	215	239	217	208	222	224	230	218
	Extraction ratio	30.2	30.3	24.7	25.7	31.2	38.3	30.6	31.6	31.9	39.0	30.0	33.6	35.1	38.3	32.4	37.8	34.1	34.5	36.5	23.2	29.9	32.9
	Mill extraction	95.9	95.5	96.3	96.3	95.1	94.3	96.0	95.4	95.8	94.8	96.1	95.4	95.5	95.2	96.3	95.5	95.5	95.4	95.3	97.3	96.4	95.7
	Reduced mill extraction	96.3	96.3	97.0	96.9	96.1	95.3	96.2	96.2	96.0	95.2	96.3	95.6	95.6	95.2	95.9	95.3	95.7	95.7	95.5	97.1	96.3	95.9
SUCROSE LOSSES	Sucrose lost in bagasse % cane	0.57	0.60	0.50	0.48	0.66	0.78	0.56	0.62	0.55	0.68	0.54	0.67	0.64	0.65	0.48	0.60	0.60	0.61	0.60	0 36	0.48	0.58
	,, ,, in filter cake % cane	0.04	0.03	0.07	0.06	0.02	0.03	0.03	0.02	0.01	0.05	0.04	0.08	0.02	0.05	0.08	0.04	0.14	0.15	0.17	0.05	0.12	0.06
	,, ,, in molasses % cane	1.02	1.03	0.94	0.83	0.91	1.32	1.00	0.98	0.87	0.94	0.86	0.89	0.83	0.74	0.83	0.82	0.86	0.97	0.82	0.80	0.74	0.90
	Undertermined losses % cane	0.22	0.25	0.12	0.13	0.36	0.41	0.24	0.20	0.10	0.28	0.16	0.22	0.29	0.34	0.12	0.14	0.17	0.25	0.13	0.22	0.15	0.20
	Industrial losses % cane	1.28	1.31	1.13	1.02	1.29	1.76	1.27	1.20	0.98	1.27	1.06	1.19	1.14	1.13	1.03	1.00	1.17	1.37	1.12	1.07	1.01	1.16
	Total losses % cane	1.85	1.91	1.63	1.50	1.95	2.54	1.84	1.82	1.53	1.95	1.60	1.86	1.78	1.78	1.51	1.60	1.77	1.98	1 72	1.43	1.49	1.74
SUCROSE BALANCE	Sucrose in bagasse % sucrose in cane	4.09	4.54	3.74	3.66	4.94	5.70	4.05	4.60	4.26	5.23	3.91	4.63	4.53	4.83	3.70	4.55	4.47	4.62	4.69	2.71	3.58	4.34
	,, ,, filter cake % sucrose in cane	0.31	0.25	0.52	0.47	0.16	0.20	0.22	0.15	0.10	0.39	0.28	0.54	0.12	0.35	0.61	0.29	1.04	1.11	1.33	0.41	0.88	0.41
	,, ,, molasses % sucrose in cane	7.31	7.85	6.98	6.25	6.75	9.65	7.23	7.31	6.68	7.28	6.21	6.18	5.89	5.49	6.37	6.31	6.49	7.36	6.37	6.00	5.57	6.69
	Undertemined losses % sucrose in cane	1.52	1.95	0.87	0.99	2.64	2.96	1.69	1.46	0.69	2.13	1.11	1.50	2.07	2.57	0.93	1.06	1.30	1.91	1.04	1.58	1.18	1.51
	Industrial losses % sucrose in cane	9.14	10.05	8.37	7.71	9.55	12.81	9.14	8.92	7.47	9.80	7.60	8.22	8.08	8.41	7.91	7.66	8.83	10.38	8.74	7.99	7.63	8.61
	Total losses % sucrose in cane	13.23	14.59	12.11	11.37	14.49	18.51	13.19	13.52	11.73	15.03	11.51	12.85	12.61	13.24	11.61	12.21	13.30	15.00	13.43	10.70	11.21	12.95
RECOVERIES	Boiling house recovery	90.5	89.5	91.3	92.0	90.0	86.4	90.5	90.6	92.2	89.7	92.1	91.4	91.5	91.2	91.8	92.0	90.8	89.1	90.8	91.8	92.1	91.0
	Reduced boiling house recovery (Pty. M.J. 85°)	87.7	88.5	90.3	90.2	88.9	84.6	86.9	89.0	89.7	87.8	89.7	87.6	87.4	86.6	88.0	89.9	88.7	86.3	87.6	88.3	88.0	88.2
	Overall recovery	86.8	85.4	87.9	88.6	85.5	81.5	86.8	86.5	88.3	85.0	88.5	87.2	87.4	87.8	88.4	87.8	86.7	85.0	86.6	89.3	88.8	87.1
	Reduced overall recovery (Pty M.J. 85°, F % C 12.5)	84.4	85.2	87.6	87.4	85.5	80.7	83.6	85.6	86.0	83.6	86.4	83.7	83.6	82.4	84.4	85.6	84.9	82.6	83.7	85.7	84.7	84.7
	Boiling house efficiency	98.7	97.9	99.2	99.2	98.6	95.8	91.8	38.8	100.0	98.8	99.8	98.5	98.2	97.8	98.8	100.5	99.2	97.6	98.9	98.9	98.4	98.8

APPENDIX

THE MAURITIUS HERBARIUM

REPORT FOR 1971

Flora of the Mascarene Islands

Financial support having been obtained, the project has now been launched. The Mauritius Government and O.R.S.T.O.M. have both accepted to contribute towards the cost of editing and publishing the flora ; on the other hand, the Overseas Development Administration of the Commonwealth has accepted to meet the expenses incurred with the posting of a botanist at Kew for three years, plus the cost of any essential visits in the Mascarene area.

Four meetings of the Mauritius Sub-Committee for the Flora were held during the year. Prior to the last meeting several working sessions took place during which Messrs. Bosser, Marais and Cadet discussed technical matters on the specimen family *Rutaceae* with members of the Herbarium staff. The printed proof of this specimen family prepared by Dr. R.E. Vaughan served its purpose as a number of technical problems arose and were solved.

Agreement between Kew, O.R.S.T.O.M. and the Mauritius Sub-Committee was also reached on the modality of publication : it will be in the form of fascicles and in the French language.

Preliminary discussions on the composition of the Editorial Board and the allocation of families to specialist contributors also took place and it is hoped that these matters will be finalized in the coming year.

Accessions

During the year, 591 herbarium sheets were added to the collection :

Mauritius	408
Réunion	146
Diégo Garcia	37

Valuable donations by overseas institutions and collectors are here gratefully acknowledged :

Sir Colville Barclay Bt. of Sussex, England, during his stay in Mauritius in November, made further botanical collections and kindly shared his material between the Herbarium, Royal Botanic Gardens, Kew, and the Mauritius Herbarium.

Mr. Thérésien Cadet, of the *Centre Universitaire de la Réunion*, presented the Herbarium with a flowering specimen of the saxifragaceous plant *Berenice arguta*. The species is endemic to Réunion and was believed to have become extinct. After this rediscovery, it is hoped that efforts will be directed towards its conservation in its native habitat and trials made on its cultivation and propagation.

A set of duplicate herbarium specimens from Diégo-Garcia, collected by Mr. A.M. Hutson of the British Musuem, Department of Entomology, during his recent stay at the Chagos Archipelago, was kindly presented to the Herbarium by the Royal Botanic Gardens, Kew. This collection comprised some valuable items not yet represented in our collections from this area.

Field work

Botanical collections are being intensively made with a view to the distribution of duplicated material to overseas herbaria and collaborators of the project for the study and eventual publication of the Flora of the Mascarenes. Efforts are also constantly being directed towards the exploration of less frequently visited areas such as patches of relict native vegetation on mountain flanks.

In April, during a short stay in Réunion, in company of Prof. H.E. Moore jr., Mr. J. Guého, the Herbarium Assistant, was able to visit the forests of Bébour, Takamaka and Mare Longue and collect a number of interesting specimens of native plant species.

The Royal Botanic Gardens, Pamplemousses

Work of naming and labelling of the yet unidentified plants in cultivation in the gardens has been pursued. A collection of specimens, comprising exotic species which the herbarium, in view of its regional character, has not got the necessary resources for determination, was submitted to the Royal Botanic Gardens, Kew, for identification. We here reiterate our thanks to the Director of this institution for the invaluable collaboration received in this connection during the past years.

Visitors

On many occasions during the year the staff of the Herbarium had the pleasure of welcoming visitors and research workers from overseas :

Mr. Käre A. Lye, Curator, Makerere University Herbarium, during a short stay was able to study the material in the Herbarium in the family *Cyperaceae* and make collections in the field.

Mr. Cedric van Ryneveld, Landscape Consultant, Durban, gathered living ornamental plants and seeds for introduction and cultivation in South Africa.

Prof. Harold E. Moore jr., Director of the L.H. Bailey Hortorium, New York State College of Agriculture, Cornell University, Ithaca, N.Y., U.S.A., during a week's stay actively studied in the field and made collections of our native palm flora. A further three days' trip to Réunion with the same aim was organized through the kind offices of the *Comité de Collaboration Agricole, Maurice-Réunion-Madagascar*. A duplicate set of his gatherings, accompanied by valuable field notes, was presented by him to the Herbarium. He also gave an interesting talk on palms under the auspices of the Royal Society of Arts and Sciences of Mauritius.

Professor M. Onraedt of the *Institut St. Berthuin Malonne*, Belgium, visited some of our nature reserves and made extensive collections of Bryophyte material. He presented the Herbarium with determined duplicate specimens of some of his gatherings.

During a three weeks' stay in Mauritius, Professor Maxwell S. Dhoty of the University of Hawaii, studied at various localities the ecology of marine algae with particular reference to the economic agar-agar yielding species. He also made collections in other groups of our local marine algae and presented to us a set of his duplicate specimens.

Dr. Sophie C. Ducker of the University of Melbourne, Australia, collected marine algae from various sites along the coast. She also visited some of the nature reserves and obtained plant specimens, notably of the ferns *Blechnum attenuatum* and *B. tabulare* for the herbarium of the University.

Distribution to Institutions overseas

A living example of the attractive fern species *Adiantum reniforme* was despatched by air at the request of Dr. C.N. Page, with a view to its cultivation and cytological research at the Royal Botanic Gardens, Edinburgh.

Material of indigenous *Flacourtiaceae* and *Samydaceae* was presented to Dr. H. Sleumer, *Rijksherbarium*, Leiden, Netherlands, who kindly communicated to us his opinion as to their taxonomy.

Specimens of indigenous *Cyperaceae* of the genus *Elaeocharis* were sent to Mr. Marc Thiebaud, *Conservatoire et Jardin Botaniques de Genève*, for cytological and taxonomic studies.

In conclusion of this section, we wish to express our thanks to Professor R.E. Holttum at the Herbarium, Kew, who kindly determined a number of fern specimens from our collections, and to Mr. E.W. Jones for naming part of the *Hepaticae* gatherings made by Sir Colville Barclay.

Publications

A list of some interesting taxonomical and related publications on the Mascarene islands, Madagascar and the Comoro Islands, acquired by the Herbarium Library during the year is given below :-

BERNARDI, L. (1971). Araliacearum Madagascariae et Comores propositum. 2. Revisio et taxa nova Polysciadum. *Candollea* **26**, 1 : 13-89.

BIZOT, M. (1968) Mousses récoltées par Mr. Gillis Een dans les Iles Maurice et de La Réunion. *Svensk. bot. Tidskr.* **62**, 3 : 471-481.

BOSSER, J. (1971). Contribution à l'étude des *Orchidaceae* de Madagascar. XV. Nouvelles espèces du genre *Aeranthes* Lindl. *Adansonia*, ser. 2, **11**, 1 : 81-93.

BOSSER, J. (1971) Contribution à l'étude des *Orchidaceae* de Madagascar. XVI. Espèces nouvelles du genre *Bulbophyllum* Thou. *Adansonia*, ser. 2, **11**, 2 : 325-335.

BOSSER, J. *et* MORAT, P. (1969). Contribution à l'étude des *Orchidaceae* de Madagascar. IX. Les genres *Grammangis* Rchb. f. et *Eulophiella* Rolfe. *Adansonia*, ser. 2, **9**, 2 : 299-309.

BOSSER, J. *et* MORAT, P. (1971). Sur deux Asclépiadacées nouvelles du Sud de Madagascar. *Adansonia*, ser. 2, **11**, 2 : 337-342.

CADET, Th. (1970) Etude sur la végétation du Cirque de Cilaos, Ile de La Réunion, Océan Indien : la végétation liée aux cultures. *Annls Fac. Sci. Marseille* **44** : 79-93.

CADET, Th. (1970). Une espèce nouvelle du genre *Eriothrix*. Cass. *Adansonia*, ser. 2, **10**, 2 : 267-269.

CADET, Th. (1970). Contribution à l'étude des Composées de La Réunion. I. Les Inulées. *Adansonia*, ser. 2, **10**, 4 : 537-551.

HEINE, H. *et* HALLE, N. (1970). Une Rubiacée des Iles Mascareignes à feuilles ornamentales : *Enterospermum borbonicum*. Observations botaniques, horticoles et taxonomiques. *Adansonia*, ser. 2, **10**, 3 : 315-327.

KAM, Y.K. *and* STONE, B.C. (1970). Morphological studies in *Pandanaceae*. IV. Stomate structure in some Mascarene and Madagascar *Pandanus* and its meaning for infrageneric taxonomy. *Adansonia*, ser. 2, **10**, 2 : 219-246.

OWADALLY, W.A. (1971). MAURITIUS. *Forestry Service*. Reports for the years 1969 and 1970.

STONE, B.C. (1970). Observations on the genus *Pandanus* in Madagascar. *J. Linn. Soc.* **63 :** 97-131.

SUSPLUGAS, J., PRIVAT, G., CADET, Th. *et* SUSPLUGAS, P. (1970).
Contribution à l'étude des Savanes tropicales :
Savanes de l'Ile de la Réunion. *Trav. Soc. Pharm. Montpellier* **30**, 1 : 23-30.
Savanes de l'Ile de La Réunion : variation dans la composition floristique. *ibid.* : 31-36.