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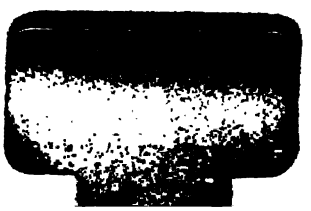
PRODUCTION AND MARKETING OF PEANUTS



PRODUCTION AND MARKETING

OF

PEANUTS

By Canute A. McLean
Chief Agricultural Economist
Planning Division
Ministry of Agriculture

1980

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AGRICULTURE IN JAMAICA

Collection of papers of the Office of IICA in Jamaica

1977 - 1978

No. I- 1 Fritz Andrew Sibbles, "Basic Agricultural Information on Jamaica Internal Document of Work", January 1977

No. I- 2 Yvonne Lake, "Agricultural Planning in Jamaica", June 1977

No. I-.3 Aston S. Wood, Ph.D., "Agricultural Education in Jamaica", September - October 1977

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No. I- 8 Jose Emilio Araujo, "The Communal Enterprise", February 1978

No. I- 9 IICA and MOAJ "Hillside Farming Technology - Intensive Short Course", Vols, I and II, March 1978

No. I-10 Jose Emilio Araujo, "The Theory Behind the Community Enterprise - Seminar in Jamaica", March 1978

No. I-11 Marie Strachan, "A National Programme for the Development of Hillside Farming in Jamaica", April 1978

No. I-12 D.D. Henry, "Brief Overall Diagnosis of Hillside Farming in Jamaica", April 1978

No. I-13 Neville Farquharson, "Production and Marketing of Yams in Allsides and Christiana", May 1978

No. I-14 R.C.E. McDonald, A.H. Wahab, "Fertility Assessment of Newly Terraced Hillside Soils Using the Microplot Technique - The Allsides Case Study", 1978

No. I-15 IICA - IDB, "Course in Preparation and Evaluation of Agricultural Projects", Vols. I and II, November 1977

No. I-16 Neville Farquharson, "Production and Marketing of Dasheen in Allsides and Christiana", June 1978

I-1 Ferrill Industries, "Production and Marketing of Industrial Fasteners" (Portland: Ferrill Industries, June 19[illegible])

I-2 [illegible], "Industrial Fasteners" (Portland: [illegible], 19[illegible])

I-3 [illegible], "Industrial Fasteners in America" (Portland: [illegible], 19[illegible])

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No. II- 1 O. Arboleda-Sepulveda (IICA-CIDIA), "Agricultural Documentation and Information Network in Jamaica"

No. II- 2 Victor Quiroga, "National Agricultural Information System" (NAIS-Jamaica) Project Profile, September 1978

No. II- 3 Joseph Johnson "A Review on Land Reform in Jamaica for the Period 1972 - 1978", September 1978

No. II- 4 Neville Farquharson, "ABC of Vegetable Farming", A Draft High School Textbook. Vols. I,II, III, and IV, February 1979

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1979 - 1980

No. III- 1 H.R. Stennett, "Watersheds of Jamaica and Considerations for an Ordinal Scale of Their Development", July 1979

No. III- 2 IICA-MAJ, "Hillside Farming in Jamaica", A Training Seminar December 1978

No. III- 3 A.L. Wright, A.H. Wahab, H. Murray, "Performance of Six Varieties of Red Peas (Phaseolus vulgaris L.) on a Newly Terraced Ultisol in Jamaica", September 1979

No. III- 4 IICA Jamaica Staff, "Agro-Socio-Economic Sample Survey of Allsides - Trelawny, Jamaica", September 1979

No. III- 5 IICA-MOAJ, "An Approach to Agricultural Settlement of Hilly Lands", October 1979

No. III- 6 IICA-MOAJ, "Tree Crops of Economic Importance to Hillside Farms in Jamaica", October 1979

No. III- 7 Canute McLean, "Production and Marketing of Peanuts", November 1979

FOREWORD

One of the strategies of the IICA Jamaica Office is to assist Jamaica in the determination and adoption of steps which are essential for building up the technical information necessary for the development of agricultural production in the sector. Some 80% of the farm land of Jamaica is found on hilly lands, and this factor will dictate the kinds of practices which are adopted.

Within the series of publications titled: "Agriculture in Jamaica", which precedes this Foreword, a number of papers, namely I-4, I-13, I-16 and II-15, deal with the production and marketing of crops. The development of crops on a more intensive basis on the hilly lands, as part of the national strategy for increasing food production, will require, inter alia, technical inputs in the adoption of appropriate practices in soil conservation and improved cropping systems.

Optimum results will require the preparation and the use of technical packages of all improvements and services, inclusive of the marketing of all the intercrops being promoted. Studies on specific crops such as yams, dasheen, red peas etc. are intended to assist in providing this information. Additionally, the studies are designed to answer logical questions raised by farmers in relation to how farm returns and farm prices for selected commodities are likely to be affected by the adoption of these improved practices, as a means of ensuring their envelopment in the development programmes.

This paper compliments others already done and helps to indicate possible scope for the development of the peanut industry in particular.

We wish to congratulate Mr. Canute McLean for his presentation on peanuts and for his co-operation in this respect with the IICA Office in Jamaica.

Percy Aitken-Soux, Ph.D
Director
IICA Jamaica

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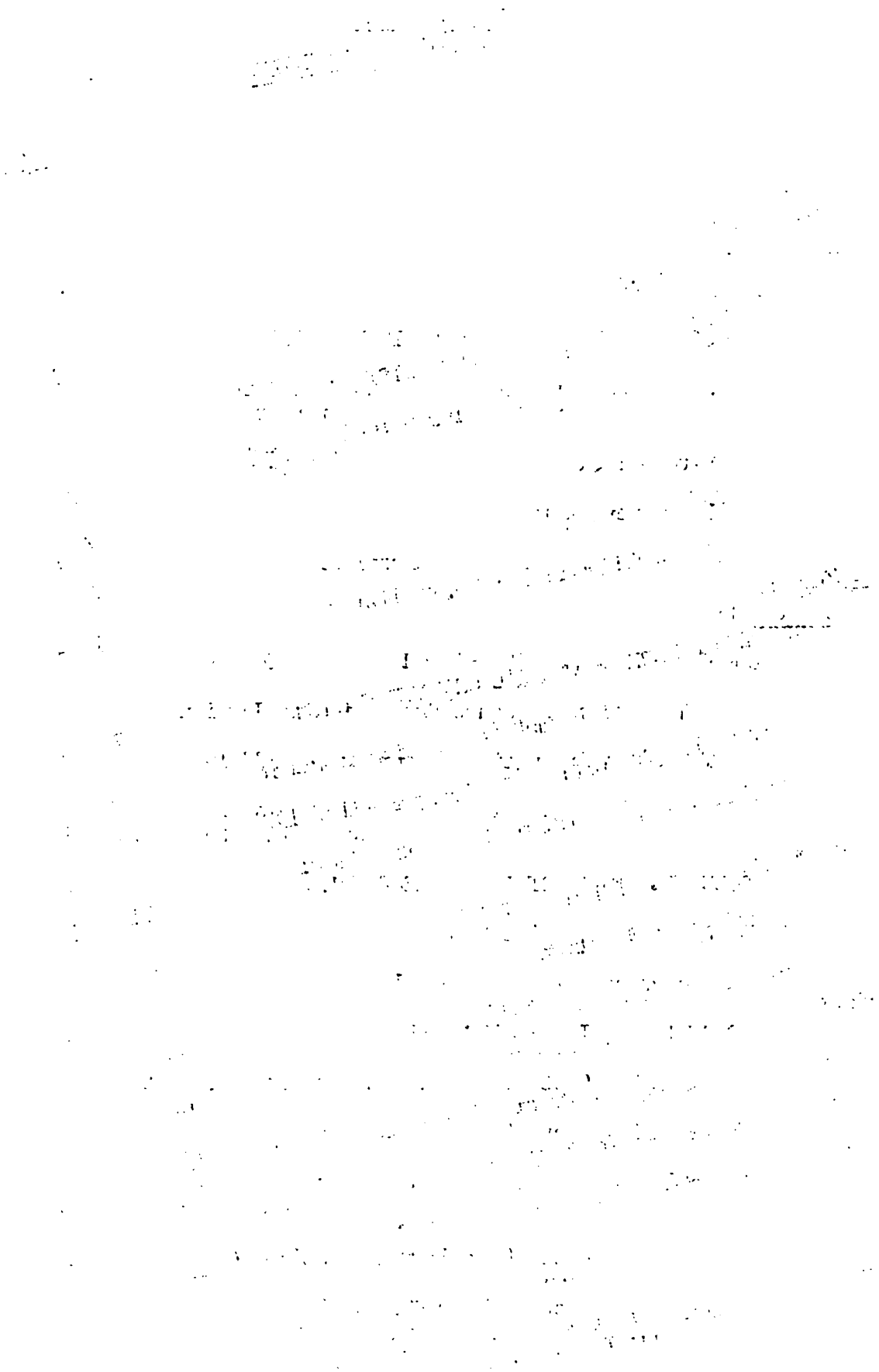

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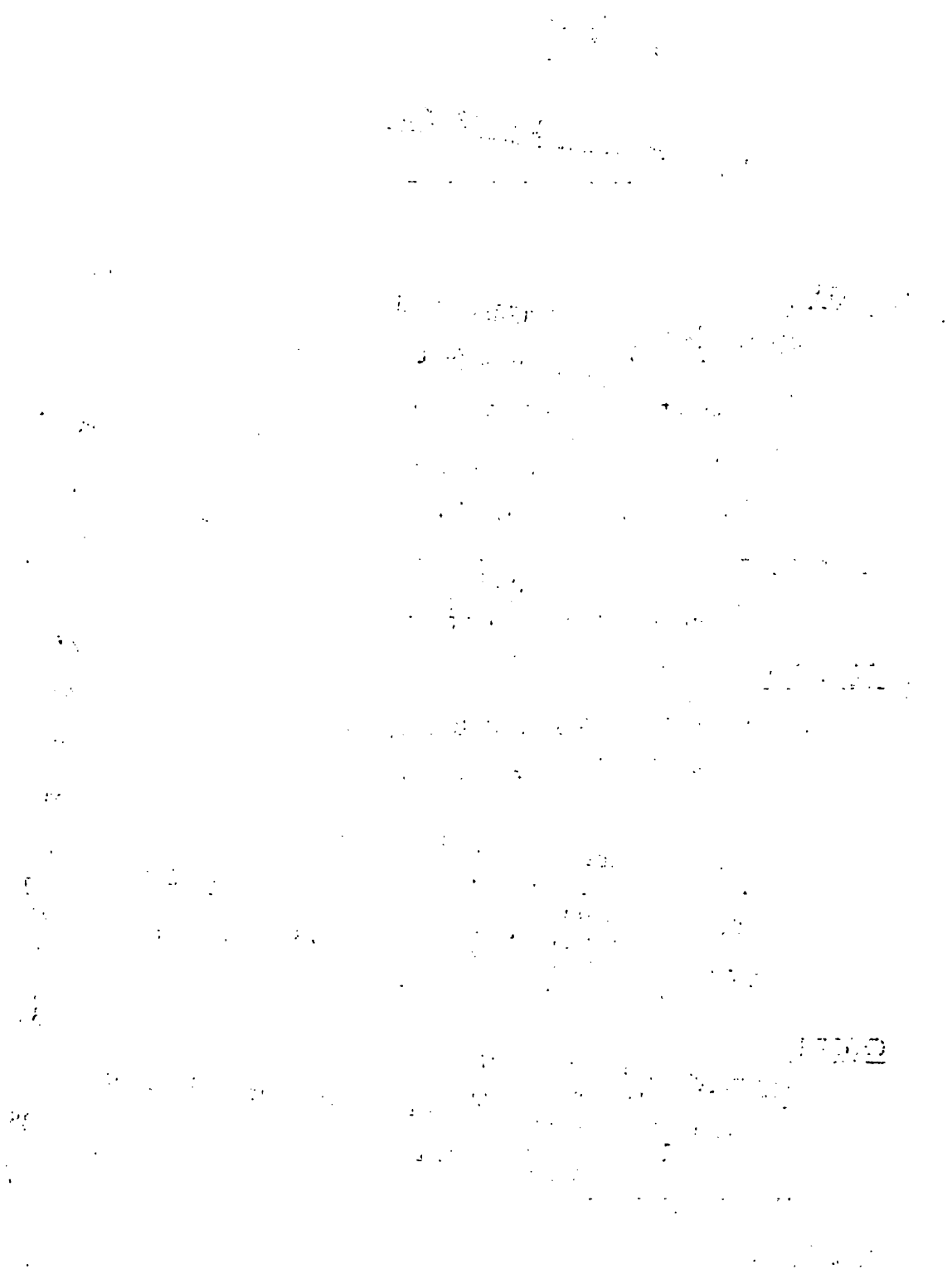

Chapter 1

INTRODUCTION

The origin of peanuts is unknown, though the literature indicates that it has been around and consumed as food from as far back as 950 B.C. The history and development of the peanut has been well documented, and it would seem that Jamaica's programme could be developed through the application of applied technology. The available evidence indicates that it was first found in Brazil or Peru, and was probably carried across to Africa by early explorers and missionaries.

There are several types of wild and cultivated varieties, and depending on the part of the globe one finds oneself, the peanut may assume any of the following names - ground nut, monkey nut, pinda or Manilla nut. The peanut is botanically known as 'Arachis hypogaea', and belongs to the leguminosae family. Ground nut, as it is often called, is probably one of the most versatile sources of plant protein. Jasper Guy Woodroof, in his book 'Peanuts: Production, Processing, Products'[1/], pointed out that George Washington Carver, the noted American educator and inventor, produced over 300 products from the peanut. Among these, he states, were mayonnaise, chilli sauce, axle grease, bleach, shampoo, metal polish, wood stains, and plastic.

Nearer home, and from as far back as the early 1900's, agricultural interests in the West Indies saw the need for, and advocated the planting of peanuts throughout the region as a source of food, oil and meal. Locally, peanuts were in great demand but the plantings were confined to small pockets on the dry southern region of the Island. These were quite inadequate to meet local demands. While subsequent efforts have considerably increased local production levels, the Island still depends to a large extent on imported peanuts to satisfy local demand.

1/ Jasper Guy Woodroof, "Peanuts: Production, Processing, Products", Second Edition, June 1972.

Cropping systems being developed at the Allsides Pilot Project in Trelawny under a joint GOJ/IICA project, with financial assistance from the Simon Bolivar Fund, have indicated a definite potential for the production of peanuts on hillside farms. This increased production potential raises questions concerning returns to peanut farmers.

The main objective of this study is, therefore, to look at the industry as a whole and to see what factors are responsible for the poor growth of the industry, and to suggest ways in which desired adjustments can be made.

More importantly, the study aims to look at the economics of peanut production generally in the Allsides/Christiana area of the country on a pilot basis, and to see to what extent this approach to production has implications for similar conditions across the Island.

PRODUCTION AND GEOGRAPHICAL DISTRIBUTION

Peanuts are grown in small pockets all over the country. The major area of concentration, however, is in the parish of St. Elizabeth, primarily because this general region comes closest to the conditions under which peanuts thrive best.

Soils and Climatic Condition Best Suited for Crop

It has been found that soils that are light in colour, friable, well drained, and somewhat sandy are ideal for growing peanuts. Those grown on red clay soils or on soils that are very high in organic matter may be stained. Similarly, it has been found that peanuts grown under heavy clay conditions tend to create problems at reaping time in that a considerable amount of the nuts are left in the ground.

Generally then, soils of a light texture that will not harden easily are best for peanut production. This type of soil is desirable because -

(i) it promotes a more uniform and well developed pod;

(ii) pegs bearing the fertilized ovules are better able to penetrate the soil surface and develop; and

(iii) harvesting presents less of a problem in that the pods are easily removed from the soil and fewer are left behind.

Quite apart from the fact that the soil should be light textured and friable, it is also desirable that extraneous matter like stones and pieces of glass be removed from the soil prior to planting.

Research has also shown that soils with a slightly acid reaction are compatible with peanut production as long as there are enough other elements present to ensure proper development. It has also been found that soils that are strongly acid or alkaline with large deposits of nitrogen and potash are undesirable. The subsoil should be deep, well drained, since the tap roots of peanuts usually go to a depth of eighteen inches on average. Level lands are usually preferred, though the crop can be produced on slopes where erosion does not present too much of a problem.

With respect to climate, the peanut requires a moderate growing period of between four and five months, with constant high temperatures and a uniformly distributed supply of moisture. The growing season ideally suited for proper growth is one that is long, warm and moist, with a very dry harvest season.

Site Selection

Research has shown that peanuts do best in areas with a good depth of free draining soil, usually two feet and over. Soils that are light in texture are ideal but all indications point to the fact that probably the most important consideration is the tilth. Ideally, one should not select sites where the slope is over 10°. For purposes of this study, however, slope should not be a constraint; terracing will be employed in the study area. It is also essential that farmers avoid sites that had recently been planted in peanuts, so that a system of rotation is desirable. Corn and sorghum are usually crops with which to rotate.

Land Preparation

Peanuts are essentially deep rooting plants, and as such thoroughly prepared soils are essential for successful cultivation. Land preparation of necessity will vary depending on soil type and previous use. Generally, however, it calls for ploughing and cross ploughing with a two-week rest between operations to promote weathering to a fine tilth. In any event the site should not be hurriedly prepared as this gives rise to patchy stands. The site should also be cleaned by removing coarse grass and crop residues. It may also be necessary to treat the soil with dieldrin or chlordane before or immediately after planting to eliminate or discourage insects and pests.

Crop Establishment and Fertilizing

It has already been stated that peanuts are grown in pockets all over Jamaica, so that time of planting, spacing and fertilizer application will differ according to the area in which the crop will be grown. Generally, however, peanuts have been found to do well on the following local soil types:

Linstead Clay Loam (No. 61)
St. Ann Clay Loam (No. 78)
Chudleigh Clay Loam (No. 73) and
Newell Clay Loam (No. 67)

Preliminary work at Allsides now indicates a real potential for the following soil types:

Wirefence Clay Loam (No. 32) and
Donnington Clay Loam (No. 36)

Planting should be timed to coincide with, or just prior to, the seasonal rains. On this basis the spring crop should be planted about April or May, with the fall crop being planted some time between August and September. Reaping is best carried out during the dry seasons, when the pods are easily removed from the earth.

With respect to fertilizers some farmers opt to use the residue from previous crops. Where this is not the case fertilizer application should take place about one week prior to planting, or at least at the time of planting. Generally, peanuts do not require fertilizers that are rich in nitrogen, but it is good practice for it to follow crops that are heavily fertilized, since the crop can utilize the residual nutrients left in the soil.

Horace W. Payne in his paper "Fertilizer Response of Peanuts on the Bauxite Soils of Jamaica" 1/ made the following observation:

> "Both soil and climatic factors combine in the Parish of St. Elizabeth to create conditions very favourable for peanut production. Research indicates that adoption of improved techniques, particularly proper fertilizing, would result in production increase from present acreage devoted to the crop, capable of satisfying local demands and saving foreign exchange."

Commenting further on three fertilizer trials conducted during the peanut cropping season on two major soils involved in peanut production, Payne observed 'demonstrable response to complete N.P.K. fertilizers placed below the seed at planting'. It was his opinion that fertilizer formulations high in phosphate were particularly advantageous.

1/ Horace W. Payne, "Fertilizer Response of Peanuts on the Bauxite Soils of Jamaica"

Chapter 11

THE PROJECT AREA - GENERAL CHARACTERISTICS

Up to and preceding the reorganization of the Ministry of Agriculture, Allsides was one of the extension areas making up the Christiana Area Land Authority. While the area is more generally located in the parish of Trelawny, social, economic and geographical factors link it more closely with the town of Christiana which is situated in Manchester. The project area consists of an estimated 622 acres, and is located in the south-eastern part of Trelawny. The terrain is essentially very hilly and rugged, with deeply cut valleys. In terms of elevation it lies between 2,000 feet and just over 2,800 feet above sea level. The average rainfall of the area is estimated to be just over 80 inches annually, with the heaviest rains falling usually in the months of May and October. The temperature ranges from a winter low of approximately 52°F, to a summer high of 85°F.

The two major soil types found in the area are the Wirefence Clay Loam and Donnington Gravelley Loam. The Wirefence Clay Loam is a dark reddish-brown clay loam. It is a very acid soil with pH of 4.5-5, and usually the fertility is very low. The major weakness of this soil type is that it erodes very easily so that extensive soil conservation practices are paramount to agricultural development within the project area. It is approximately 36 inches deep, the soil is fairly well drained and suitable for peanut production. This soil type occupies approximately 84% of the soils in the project area.

The Donnington Gravelley Loam, on the other hand, occupies approximately 16% of the project area. The major characteristic of this soil is that the first four to six inches are gravelley and dark brown in colour. Below this the colour becomes reddish brown down to approximately two feet, below this it is constituted essentially of pebblly conglomerates.

[illegible]

[illegible]

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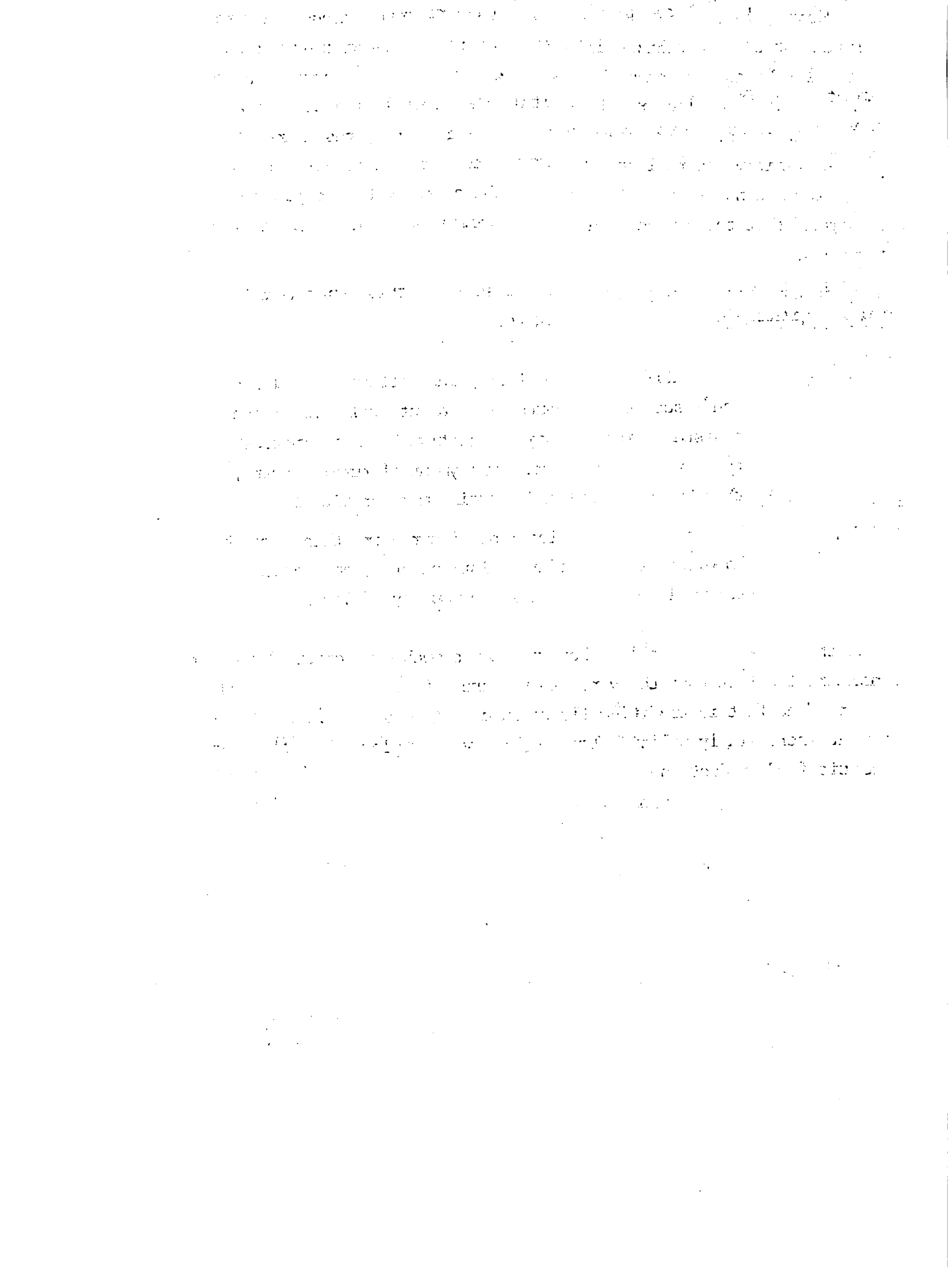
The soil is well drained, easily erodible yet not as acid as the more predominant Wirefence Clay Loam, the pH being in the range of 6.5-7.0.

The property at Allsides is occupied by an estimated 230-250 farmers, with individual holdings averaging approximately two acres. Generally, productivity in the area is considered low primarily because farmers pointed out that fertilizer usage was almost non.-existant for the most part, because of cash-flow problems, and more so because farmers tend to move from place to place within the general project area to grow their crops. Quite apart from the general crop, husbandry was almost primitive as reflected in burning the land, this being the most widespread means of land clearing. At the start of the project it was estimated that the per acre income per annum was of the order of $460 for yams.

Against this background, therefore, the scope of this study will be couched within the following parameters:

1. To identify a system of cropping pattern on hillside lands such that peanuts plan an integral part of such a system, with the major objective being to increase the level of income and employment of rural farmers, thereby making hillside farming more profitable;
2. To examine the implications of spreading this body of knowledge to the wider Christiana area, and indeed to the whole hillside farming community of Jamaica.

Given the problem a workable solution becomes much more critical when one considers the fact that the very limited area of the country generally regarded as flat is traditionally taken up with export-oriented crops, so that increasingly hillside lands will have to play a bigger role in domestic food production.



Major Areas of Peanut Production in Jamaica

As previously stated, peanuts are grown in small pockets all over Jamaica. While this is still so, the area of major concentration is in the south western region of the Island, and particularly the parish of St. Elizabeth. Within this parish large acreages of peanuts may be found in the Newton, Northampton, Whitehall, Holland Mountain, Santa Cruz and Bascayne areas. Of the 6,346 acres of peanuts produced in Jamaica in 1978, St. Elizabeth produced an estimated 4,774 acres. Other parishes with far sized acreages are Clarendon, with just over 180 acres in 1978, and St. Catherine and Manchester, with 182 and 61 acres respectively.

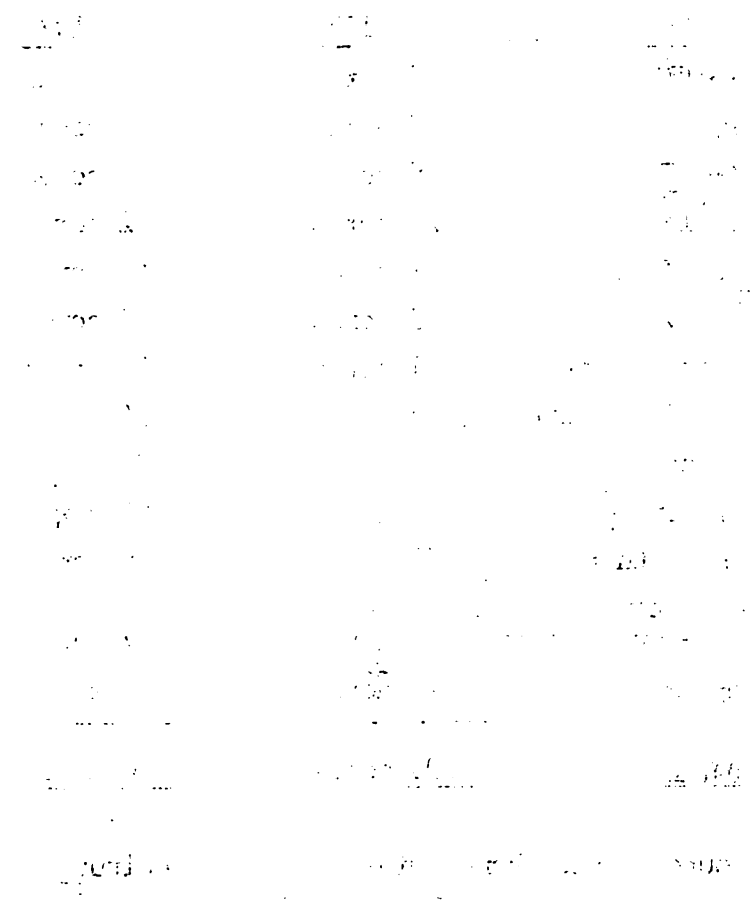
As pointed out earlier, one of the major objectives in this study is to compare and contrast production methods and type of husbandry in the project area, (Allsides) examine the feasibility of peanut production and see to what extent the findings here can be applied to other hillside areas in Jamaica.

To make the analysis more simple the approach to be used here will be that of examining the method of production in the traditional producing area, what type of cost structure is involved and average levels of return. Similarly, an examination will be made of the method of production in the project area, and a comparison made of production under both systems.

Table 1: Production by Acreage 1977-1978

Parishes	1977	1978
Portland	3 acres	3 acres
St. Mary	9 acres	20 acres
St. Ann	6 acres	5 acres
Trelawny	23 acres	42 acres
St. James	1 acre	48 acres
Hanover	3 acres	3 acres
Westmoreland	31 acres	80 acres
St. Elizabeth	3,385 acres	4,774 acres
Manchester	66 acres	279 acres
Clarendon	90 acres	651 acres
St. Catherine	57 acres	345 acres
Kingston & St. Andrew	2 acres	17 acres
St. Thomas	19 acres	79 acres
TOTAL:	3,695 acres	6,346 acres

Source: Data Bank, Ministry of Agriculture



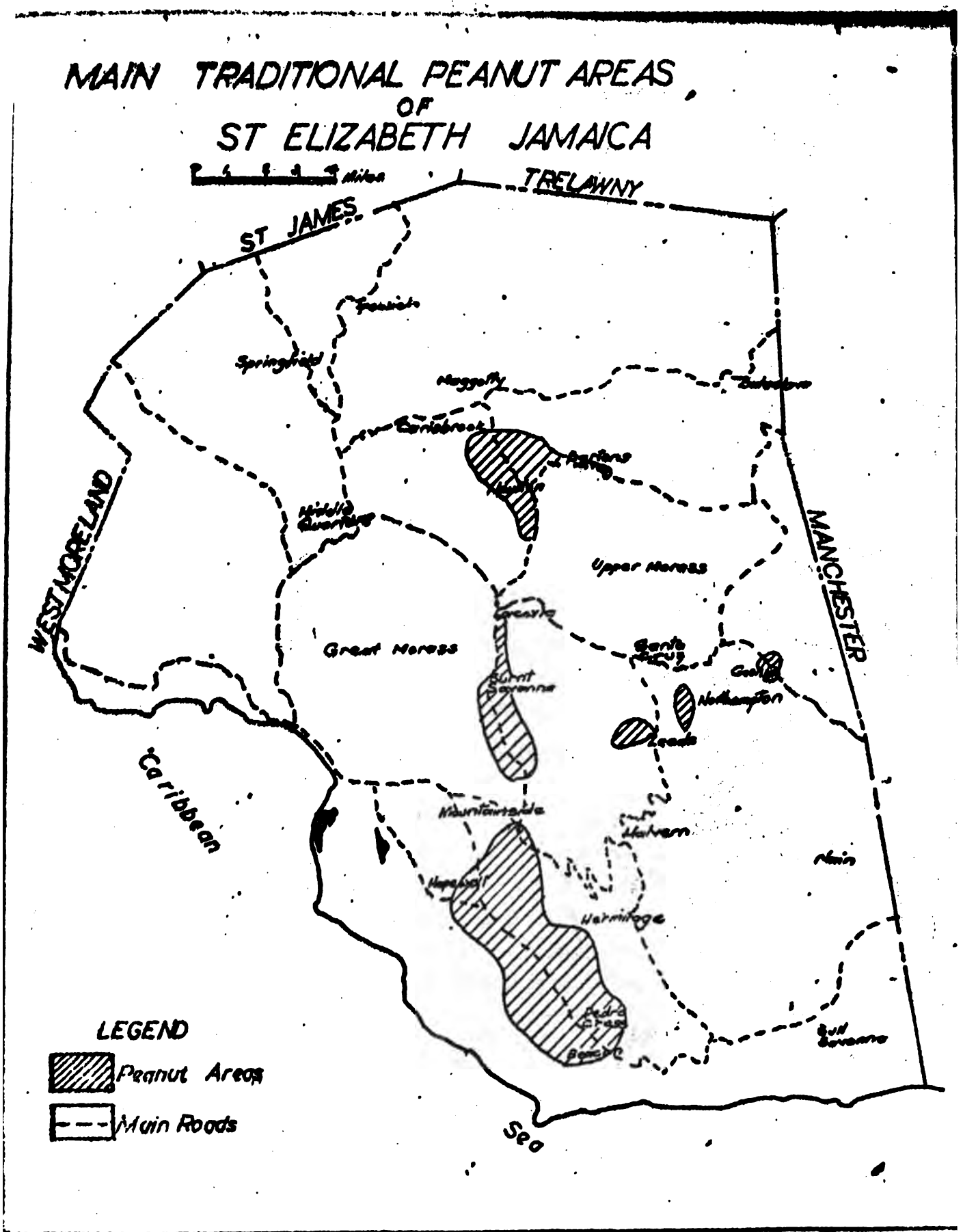
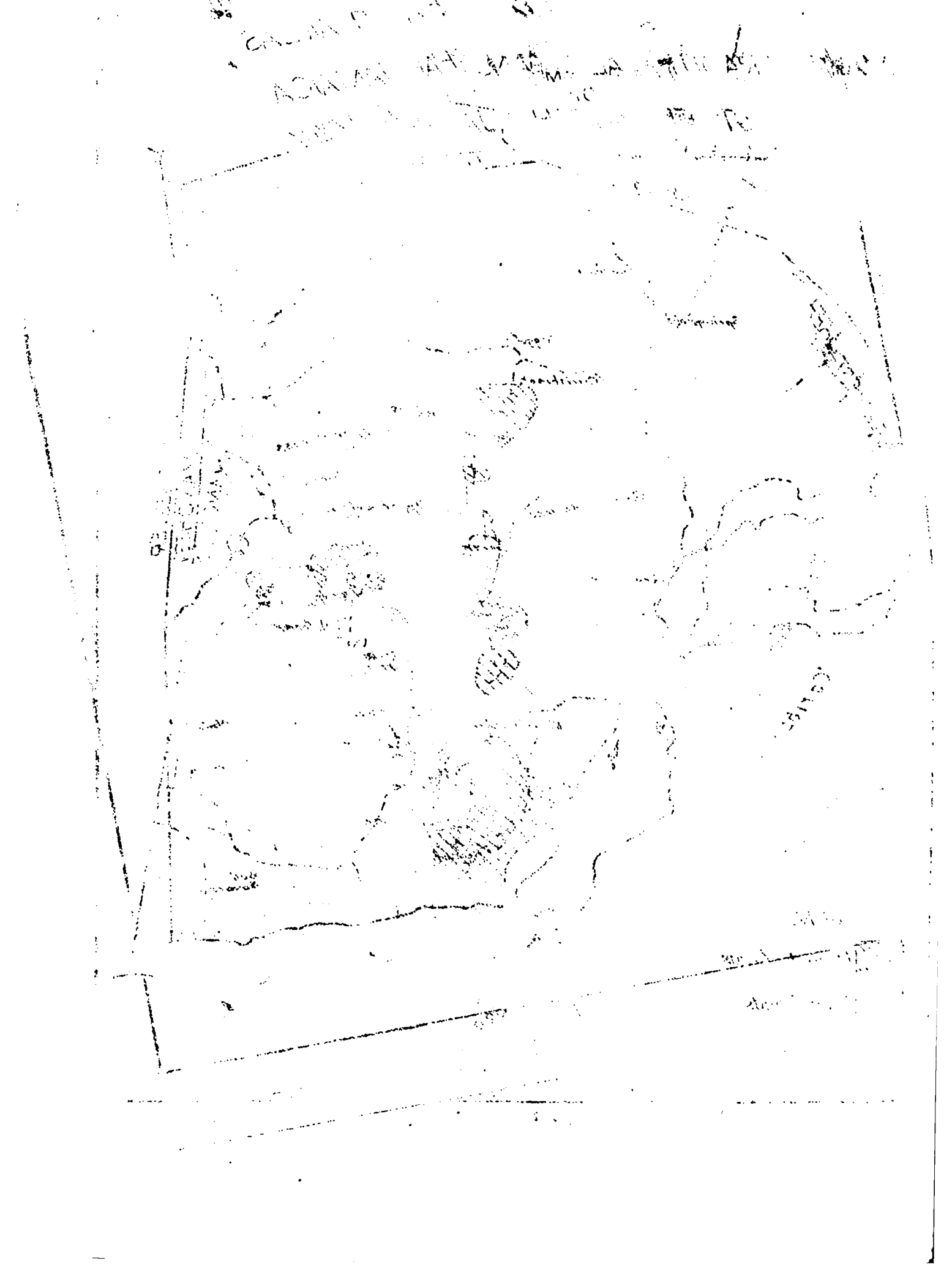

MAIN TRADITIONAL PEANUT AREAS
OF
ST ELIZABETH JAMAICA
Miles
TRELAWNY
ST JAMES
WESTMORELAND
MANCHESTER
Springfield
Middle Quarters
Upper Heroes
Great Heroes
Caribbean
Sea
LEGEND
Peanut Areas
Main Roads

Figure 1



PRODUCTION IN TRADITIONAL AREAS

The soil types generally encountered in the major producing areas are the Newell Clay Loam (No. 67), the Chudleigh Clay Loam (73) and the St. Ann Clay Loam (78). These soil types are regarded as suitable for peanut production as they are fertile and deep, and well drained.

The predominant varieties of peanuts found in the traditional producing areas are the Spanish and Valencia. While it has always been recommended that pure varietal stands be planted, farmers have pointed out that they have experienced no undue disadvantage in planting mixed stands. In addition, farmers have pointed out that in terms of adaptation these varieties are well suited to local conditions, as evidenced by yields in excess of 100 bushels (unshelled) per acre under experimental conditions.

Only a few farmers admitted to treating the seeds with any form of fungicide or insecticide prior to planting. When these are used dieldrin and orthocide seem to be the most popular.

The spacing of plants varies with conditions under which the crop will be grown. Under irrigated conditions it has been found that plant density can be increased considerably. The general practice is that planting is done in rows approximately 18 - 20 inches apart, with seeds planted approximately 4 inches apart along the rows. On this basis it generally takes about 5 bushels of unshelled peanuts to plant one acre. Farmers have pointed out that they are better able to control weeds and to carry out the other cultural practices when the fields are uniformly set out as indicated earlier.

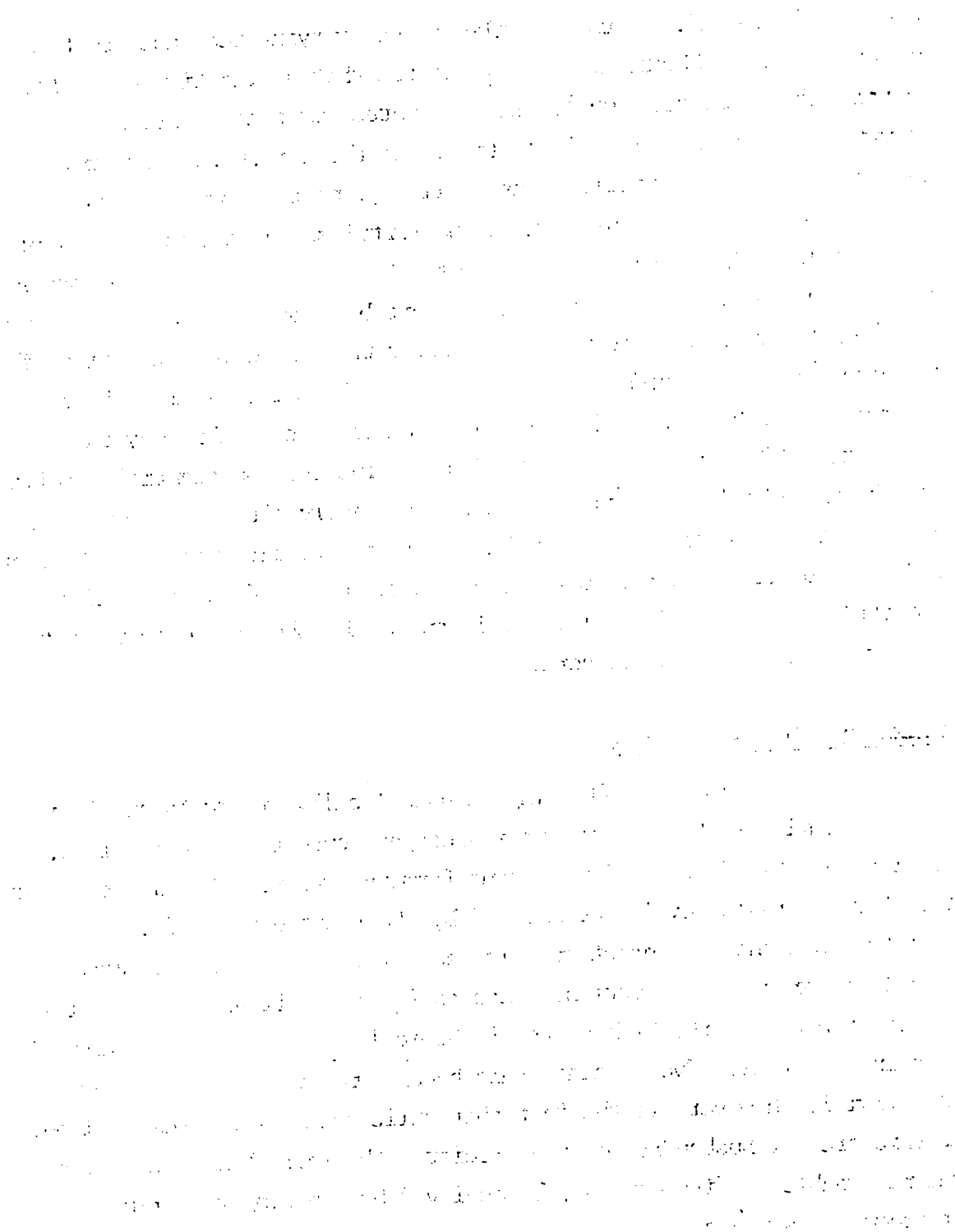
Fertilizer Application

All indications point to the fact that the ever increasing price of fertilizers over the past four to five years has reduced the level of usage among peanut farmers. This single factor alone has drastically reduced productivity in most of the areas where peanuts are grown on a large scale.

However, farmers who do use fertilizers had varying responses to time and method of application. Some indicated that application took place shortly after planting, while others pointed out that application occurred just at the time of planting. In the former case farmers indicated that the fertilizer was applied along the rows just after the young plants appeared, while those who fertilized at the time of planting explained the operation as follows. Furrows are made 3 - 4 inches in depth and approximately 18 inches apart by means of a hoe along rows. The fertilizer is then placed in a continuous band along the bottom of the furrows. The fertilizer is covered and the seeds planted about 4 inches apart before complete covering takes place. This way the seeds are buried at about a depth of 1 - 2 inches. Substantial benefits have been derived by planting peanuts immediately after crops with a high fertilizer requirement have been reaped. In this way it is thought that the quantum of fertilizer needs become less. The most popular fertilizer grades used are 12. 24. 12 and 6. 18. 27, applied at a rate of four hundred-weight per acre.

Insect and Disease Control

The most common diseases affecting peanuts locally are rusts and leaf spots. Similarly the predominant insects are cutworms, caterpillars, beetles and white grubs. Some peanut farmers have reported not following the stated spraying cycle recommended by their extension officers, so that the incidence of insect and diseased fields are sometimes very visible in areas of production. Reasons for not following a set spraying pattern range from the high costs of chemicals to the unavailability of spraying material. Even against this background, what comes through most vividly, however, is the fact that while most farmers were delinquent in this area of husbandry, most appreciated the fact that good yields and reasonable profits can only be achieved by adhering to a rigid programme of spraying.



Those farmers who follow a definite spraying cycle indicated that their programme of spraying begins just about the time the young shoot emerges from the ground. Some farmers indicated that they normally stick to a fortnightly spraying cycle, while others in areas of higher rainfall work with a weekly cycle. Spraying is continued throughout the duration of the crop and ceases at the first sign of maturity.

PRODUCTION IN THE PROJECT AREA

Given the hilly nature of the project area, planting was of necessity confined to terraces. Here the main crop is yams, so that peanuts are used to intercrop yams. Whereas an estimated 5 bushels of peanuts are used as planting material under pure stand conditions, in this case between 3 and 4 bushels are used. The fact that yams are planted first means that for the planting of peanuts only the furrows are now needed.

The residual effect of the fertilizer from the previous crops in most cases reduced the need for standard levels of fertilizer application. The other cultural practices remain standard.

Interestingly enough, it is not uncommon for some farmers to follow their peanut crop with a crop of irish potatoes. The following tables give a comparison of the cost structure in respect of:

(a) production under pure stand condition in February 1979 and more recently in October 1979. These tables are designed to show the movement in costs between the period specified;

(b) the reduction in costs using the model where peanuts and irish potatoes are used to intercrop yams.

While the cost reduction affects all these crops, only peanuts are being considered for purposes of this exercise. One should note the differences in cost of producing peanuts under pure stand conditions as against the situation where intercropping is employed.

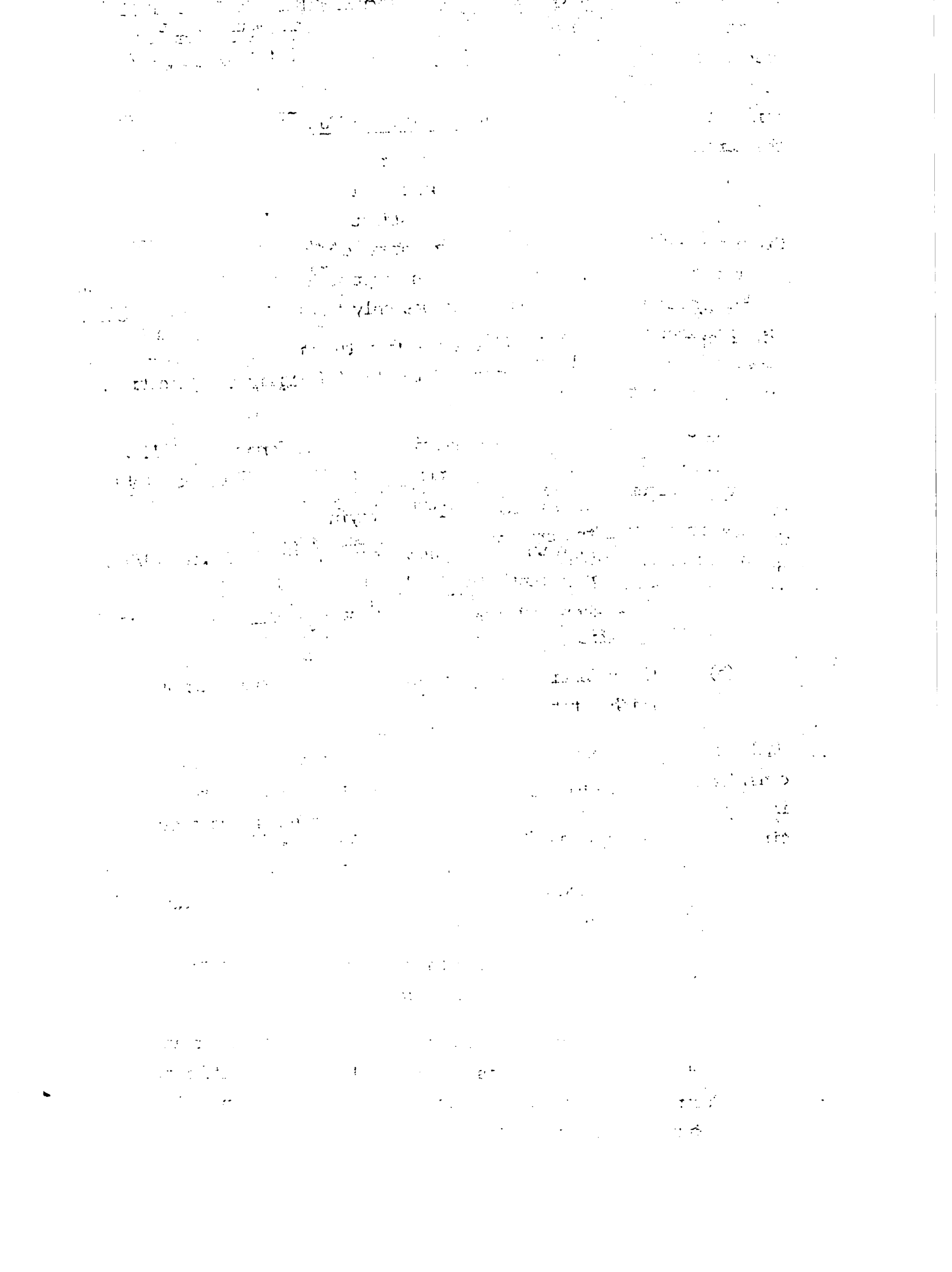


Table 2: Cost of Production Per Acre - Peanuts

A. Labour Operations	Unit Cost	Total Cost
	$	$
Land Clearing	40.00/acre	40.00
Ploughing (2 ways)	50.00 "	50.00
Harrowing (2 ways)	30.00 "	30.00
Banking	15.00 "	15.00
Planting & Fertilizing - 4 m.d.	7.00/ m.d.	28.00
Weeding & Moulding - 6 m.d.	7.00/ m.d.	42.00
Spraying - 6 times - 6 m.d.	7.00 "	42.00
Shelling & Treating - 2 m.d.	7.00 "	14.00
Reaping and Drying - 8 m.d.	7.00 "	56.00
Bagging & Transport to stores - 2 m.d.	7.00 "	14.00
		331.00
B. Materials		
Seeds - 5 bushels	16.00/bushel	80.00
Fertilizer - 4 cwt	20.00/cwt.	80.00
Dymid - 4 lb.	9.00/lb	36.00
Dithane - 12 lb.	9.00/lb	108.00
		304.00
C. Other Charges		
Contingencies and Depreciation:	10% of A	33.00
	5% of B	15.00
Land Charges	35.00/ac/yr.	18.00
Interest	10%/yr.	31.00
		97.00
Cost of Production		732.00
Add 25% Return to Management		183.00
		915.00
Marketable Yield 1,200 lbs.		
Cost per lb.		76.25¢

Table 11: Cost of Production per Acre - Peanuts

	Unit Cost	Total Cost
A. Labour Operations	$	$
Land Clearing	40.00\acre	40.00
Ploughing (2 ways)	50.00 "	50.00
Harrowing (2 ways)	30.00 "	30.00
Banking	15.00 "	15.00
Planting - Fertilizing - 4 m.d.	7.00\ m.d.	28.00
Weeding & Mounding - 6 m.d.	7.00\ m.d.	42.00
Spraying - 6 times - 6 m.d.	7.00 "	42.00
Shelling & Treating - 1 m.d.	7.00 "	7.00
Reaping and Drying - 8 m.d.	7.00 "	56.00
Bagging & Transport to store - 2 m.d./7.00	"	14.00
		321.00
B. Materials		
Seeds - 5 bushels	16.00\bushel	80.00
Fertilizer - 4 cwt	20.00\cwt.	80.00
Dymid - 1 lb.	8.00\lb	16.00
Dithane - 12 lbs.	8.00\lb	108.00
		284.00
C. Other Charges		
Containgencies and Depreciation:	10% of A	32.00
	5% of B	14.00
Land Charges	35.00\acre	18.00
Interest	10%\yr.	32.00
		92.00
Cost of Production		732.00
Add 25% Return to Management		183.00
		915.00
Marketable Yield 1,200 lbs.		76.25¢
Cost per lb.		

Table 3: Cost of Production Per Acre

Crop: Peanut
Duration: 4 months

Population: 87,000 (18"x4")

Items	No. of Times	Rate	Cost ($)
A. Labour Operations			
Land Clearing	1	$50.00/acre	50.00
Ploughing and Harrowing	1	$80.00 "	80.00
Banking	1	$30.00 "	30.00
Shelling, treating & planting - 4md	1	$ 8.00/md	32.00
Fertilizer Application - 2 md	1	$ 8 "	16.00
Weeding and Moulding - 10 md		$ 8 "	80.00
Reaping and Threshing - 8 md	1	$ 8 "	64.00
Drying and Bagging - 5 md	1	$ 8 "	40.00
Sub-Total			392.00
B. Materials			
Planting material - 5 bushels		$16.00/bushel	80.00
Fertilizer - 4 cwt.		$25.00/cwt	100.00
Dithane - 6 lbs.		$ 9.00/lb	54.00
Basudin - 6 lbs		$ 9.00/lb	54.00
Sub-Total			288.00
C. Other Charges			
Contingencies and Depreciation	10% of A 5% of B		39.00 14.00
Land Charges		$35.00/acre	16.00
Interest - 12% p.a.			43.00
Sub-Total			114.00
Return to Risk and Management 25%			199.00
Total Cost of Production			993.00
Yield: 1,200 lbs.			
Cost Per lb. = 83¢ per lb.			

October 1979.

Table 4: Cost of Production Per Acre of Bench Terrace

Crop: Yam
Rotation: Yam - Peanut - Irish Potato Population: 1,000 hills
Duration: 1 year

Items	No. of times	Rate	Cost ($)
A. Labour Operations			
Land Preparation	1		45.00
Dig hills and open	1	40¢/hill	400.00
Transport Plants to field and plant - 10 m.d.	1	$8.00/md	80.00
Transport stakes to field and stake - 15 m.d.	1	$8.00 "	120.00
Mulching (cutting & spreading 6 md	1	$8.00 "	48.00
Weeding	1	$50/ac.	50.00
Wrapping vines and fertilising - md		$5.00/md	32.00
Reaping and packing		40¢/hill	400.00
Sub-Total			1,175.00
B. Materials			
Yam Heads - 50 cwt.		$30/cwt.	1,500.00
Stakes (at half cost)		40¢ each	200.00
Fertiliser - 6 cwt.		$25/cwt	150.00
Sub-Total			1,850.00
C. Other Charges			
Contingencies and Depreciation:	- 10% of A		118.00
	- 5% of B		93.00
Land Charges		$35/ac/yr	35.00
Interest	- 12%		384.00
Sub-Total			630.00
Return to Risk and Management 15%			549.00
Total Cost of Production			4,203.00
Less Revenue from sale of yam heads (2 tons @ $30/cwt.)			600.00
Net Cost of Production			3,603.00

Yield = 12,000 lbs.
Cost per lb. = 30¢

Note: Cultivation done on 66 chains of 10ft. bench Terrace.

October 1979.

Table 5: Cost of Production Per Acre - (Jamaica)

On Bench Terrace
Cropping Scheme: Yam - Peanut - Potato
Crop: Peanuts (4 months)
Area: Allsides, Trelawny
Duration of Scheme - 1 year
Plant Population" - 52,300

Items	Rate	Cost($)
A. Labour Operation		
Land Preparation		45.00
Banking		30.00
Shelling, treating and planting 2 m.d.	$8.00/m.d.	16.00
Weeding and moulding- 5 m.d.	$8.00 "	40.00
Spraying - 3 m.d.	$8.00 "	24.00
Harvesting and threshing - 3 m.d.	$8.00 "	24.00
Drying and bagging - 2 m.d.	$8.00 "	16.00
Sub-Total		195.00
B. Materials		
Planting material - 3 bushels	$16/bushel	48.00
Dithane - 6 lbs.	$ 9/lb	54.00
Basudin - 6 lbs.	$ 9/lb	54.00
Sub-Total		156.00
C. Other Charges		
Contingencies and Depreciation:	10% of A	20.00
	5% of B	8.00
Land Charges - $35.00 per year		18.00
Interest - 12% per year		22.00
Sub-Total		68.00
Return for Risk and Management - 20%		84.00
Total Cost of Production		503.00

Remarks: Total land prepararion charge divided equally among different crops in rotation.

Marketable Yield: 1,200 lbs.

Cost of production per lb. = 42¢

October 1979.

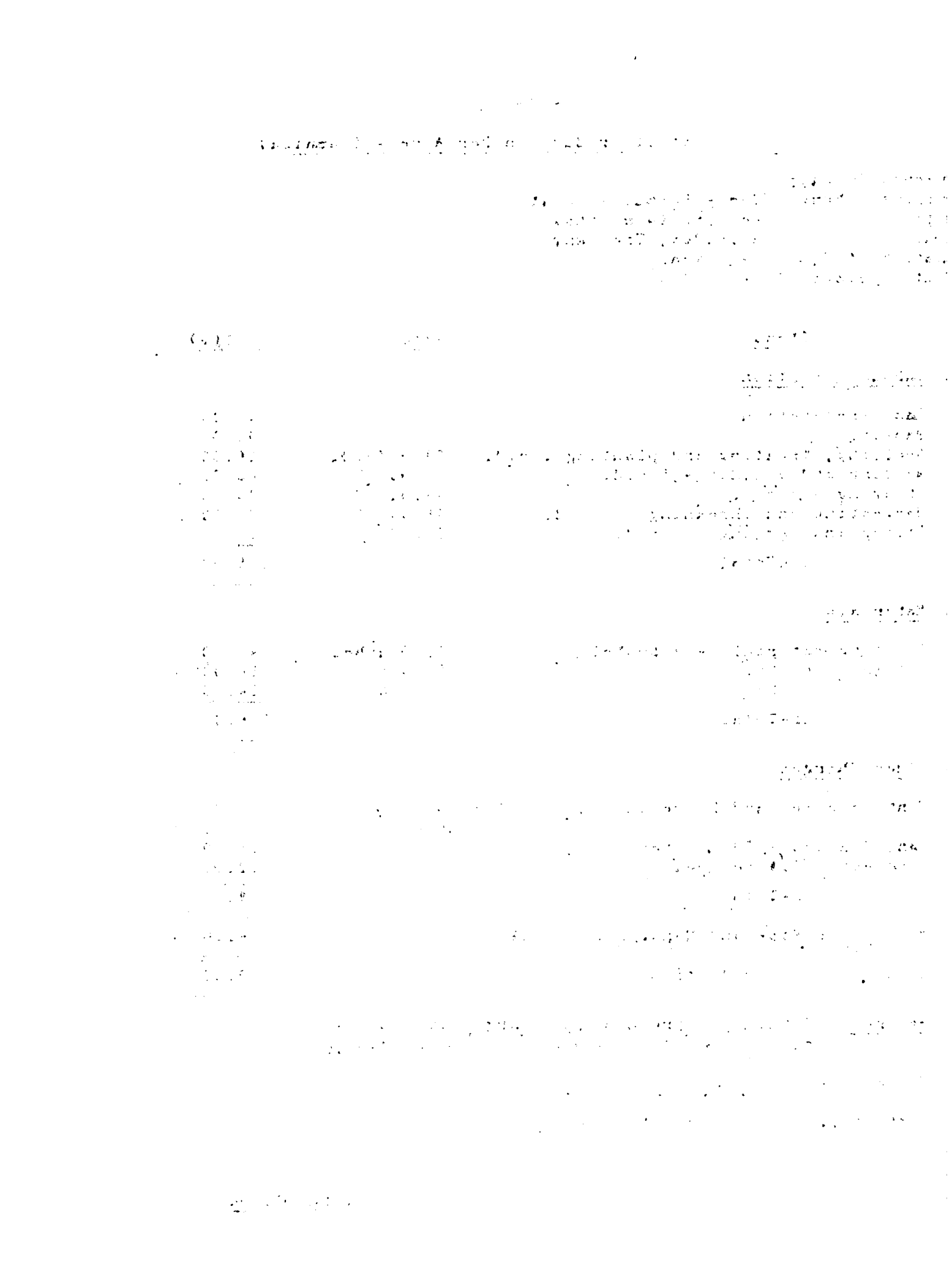


Table 6: Cost of Production

Cropping Scheme: Yam - Peanut - Irish Potato
Crop: Irish Potato
Duration: 4-6 months

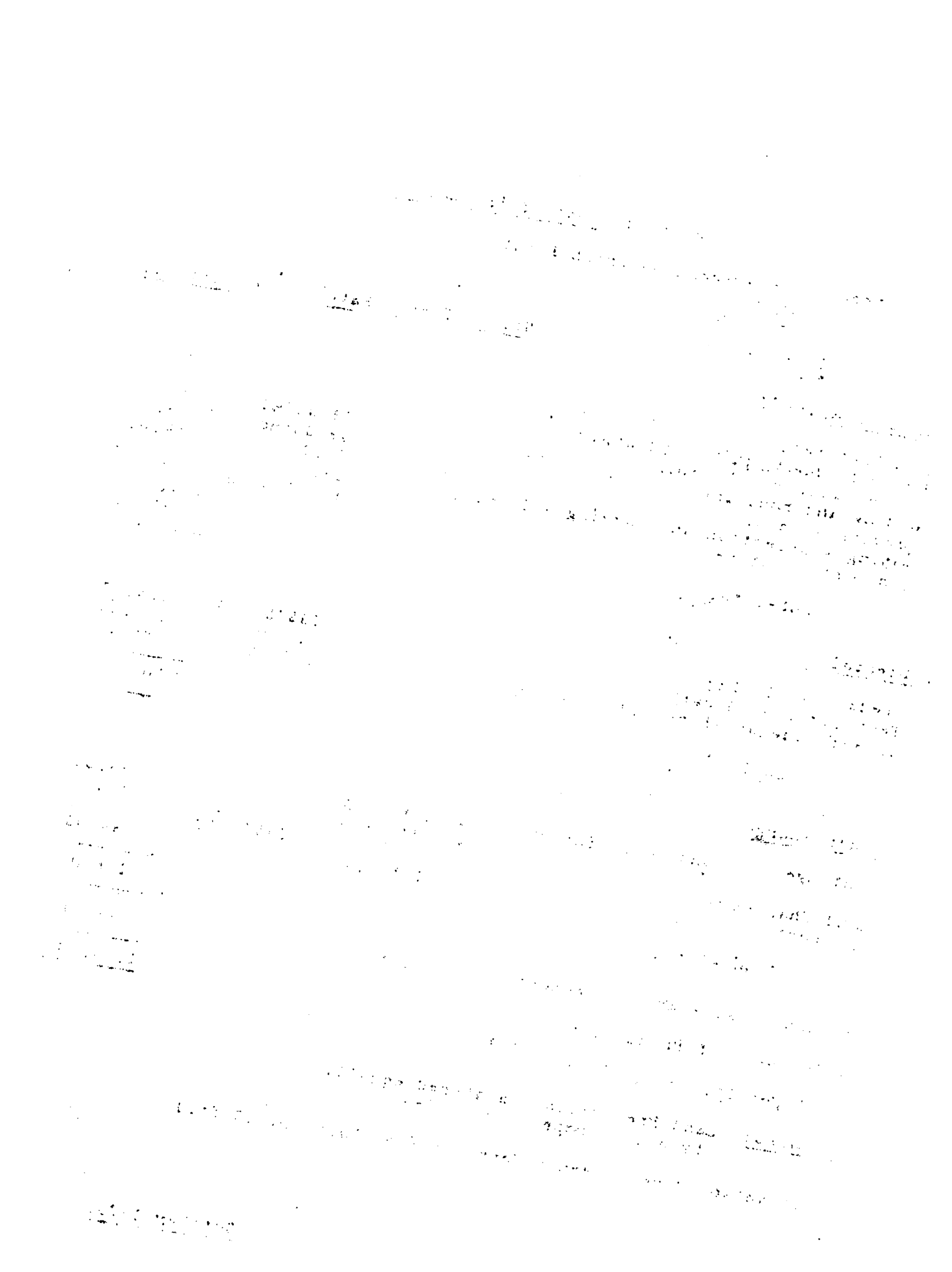
Items	No. of Times	Rate	Cost ($)
A. Labour Operation			
Land Preparation	1		45.00
Furrow by hand, plant and apply fertilizer - 10 m.d.	1	$8.00/md	80.00
Weeding and moulding - 8 m.d.		$8.00/md	64.00
Spraying -8 m.d.	8	$8.00 "	64.00
Reaping - selection and bagging - 10 m.d.		$8.00 "	80.00
Transport to Stores		60¢/100 lb	60.00
Sub-Total			393.00
B. Materials			
Seeds - 15 bags		$35/bag	525.00
Fertilizer - 10 cwt.		$25/cwt	250.00
Insecticide and Fungicide - 32 lbs.		$ 9/lb	288.00
Sub-Total			1,063.00
C. Other Charges			
Contingencies and Depreciation	- 10% of A		39.00
	- 5% of B		53.00
Land Charges		$35/ac/yr	10.00
Interest	- 12% p.a.		86.00
Sub-Total			196.00
Return to Risk and Management	- 20%		330.00
Total Cost of Production			1,982.00

Cost per lb. = 25¢

Remarks: Land Preparation is shared equally by all 3 crops in rotation.

Cultivation done on Bench Terraces (66 chains by 10 ft.)

October 1978.



Chapter 111

HARVESTING, CURING AND SHELLING PEANUTS

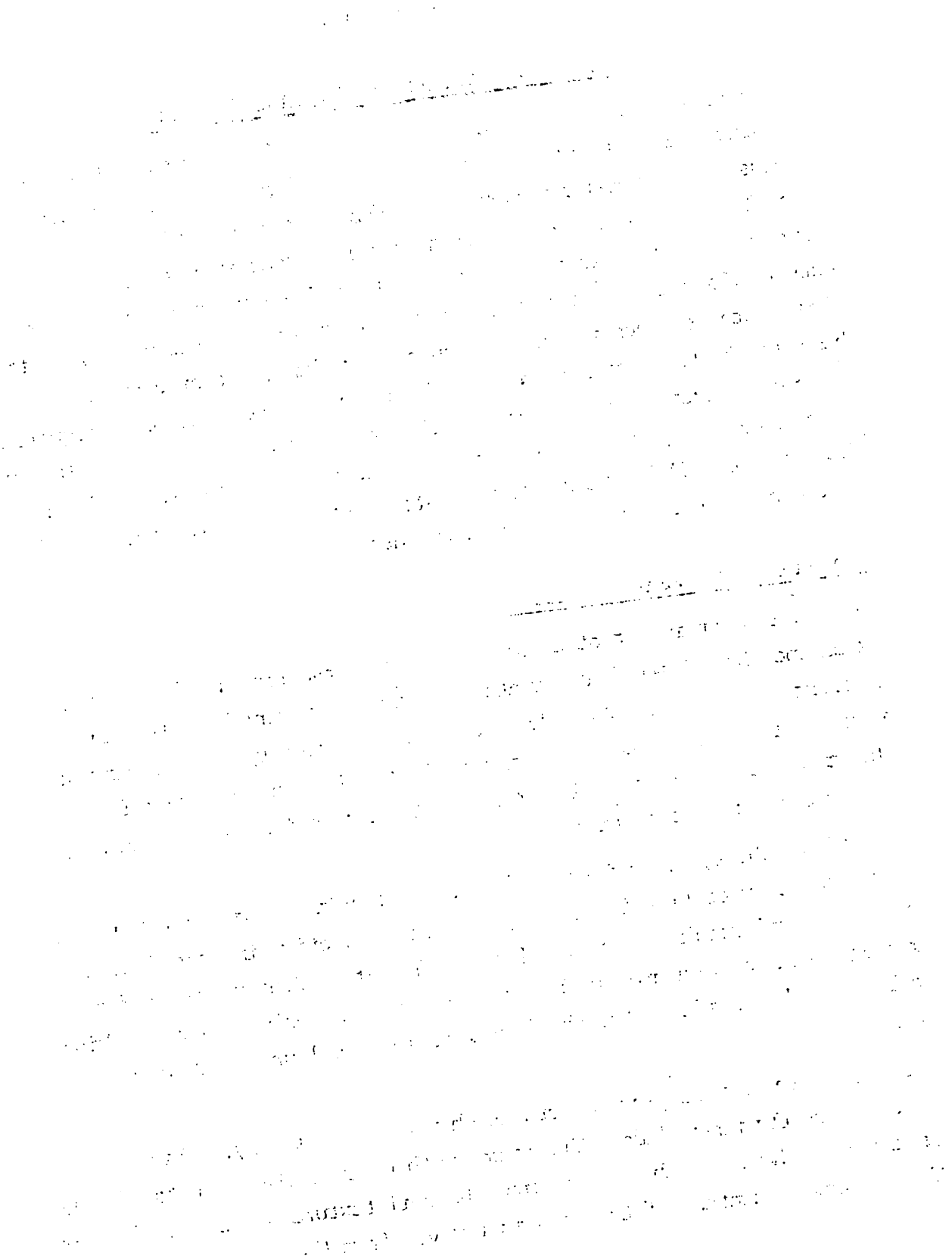
By now it should be clear that quality control of peanuts, like that of any other agricultural crop, begins on the farm and continues during the processes of harvesting, curing, shelling, storing, and manufacturing. Probably one of the major problems Jamaica faces in respect of post-harvest technology is the great time lapse between harvesting and the nuts reaching the processors. On the other hand in countries like the United States, factors like mechanical handling, better control of humidities, temperatures and air flows, have reduced the time required to bring peanuts from the farm to the processors considerably. It would seem, therefore, that a considerable amount of adaptive research and development will be necessary to hasten post-harvest preparation and at the same time ensure high quality nuts.

Harvesting and Curing Peanuts

The single most important consideration at harvesting is the timing. Experience has shown that premature harvesting invariably gives rise to immature pods with shrivelled kernels. Conversely, if the harvesting is too late, many of the pods will be lost. The onus is, therefore, on the grower to choose the time when the largest number of pods will be in a fully mature condition.

Generally, the type, variety, and date of planting provide rough indices as to the correct time for reaping. A more objective indicator, however, is to dig and examine a sample of the pods. Nuts that are ready for reaping will show mature, fully developed kernels with a mature looking colour. The inside of the shell will begin to colour and show dark veins.

The ideal time for reaping peanuts is when the soil is dry. This way the pods are easily removed from the ground without excessive amounts of soil sticking to them. At the same time the soil texture should be of such that a high percentage of the pods is removed from the ground.



In addition, good quality is enhanced by ensuring that drying occurs at a rate which keeps the outer layer at a moisture content which is slightly lower than that of the kernel. Experience has shown that where there is a disparity in the rate of water loss between the outer layer of the nuts and the interior what usually happens is that the skins tend to be removed from the kernel during milling.

Tests have shown that peanuts dried with hot air, alternated with cool air every two hours had less skin slippage and splitting than peanuts dried under purely warm conditions. However, under local conditions the proposals are to use solar heating via barbicues and similar drying areas.

Probably the single most important factor this has contributed to the very limited growth within the local industry is the problem of Aflatoxin. Aflatoxin is produced by the fungus Aspergillus flavus. Research has shown that peanuts become susceptible to contamination by this and other fungi when they:

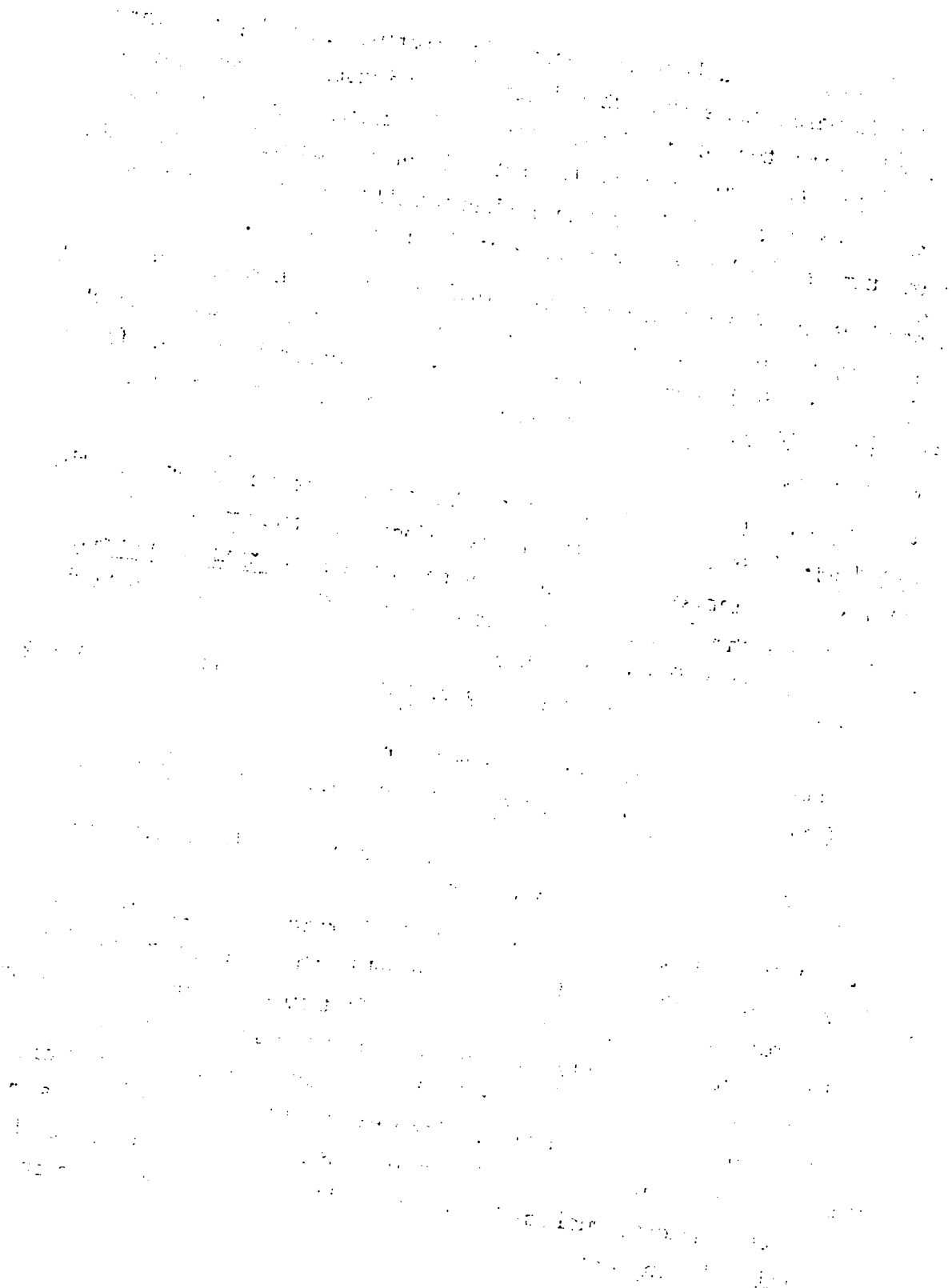
(i) are damaged by certain of the small fungus grower termites;

(ii) experience severe drought;

(iii) are punctured or otherwise damaged by certain pests; and

(iv) burst in the soil because of alternating wet and dry conditions.

Quite apart from the above, the method of drying and the conditions under which peanuts are stored are probably the most important factors influencing the presence or absence of Aflatoxin. Securing the right moisture content as early as possible after reaping and providing ideal storage conditions are probably the best measures for reducing the incidence of contamination. Farmers should, in addition, observe anti-contamination measures like making sure that storehouses are free from rats, insects, unclean floors and walls, and unclean packaging material and equipment.



Moisture Content

It has been found that moisture content is a critical consideration during harvesting, drying, storing and marketing of peanuts. Under local conditions peanuts are usually reaped at an average moisture content of about 18 - 25% (wet basis). For the most part shelled peanuts for marketing should have a moisture content of about 7.5%.

Research has shown that peanuts that are dried too rapidly or stored at a low moisture content will have a high percentage of split and bald kernels when shelled, whereas peanuts dried too slowly or stored at high moisture content are more subject to mold growth and aflatoxin production.

At time of reaping it is estimated that peanuts generally contain between 35 and 55% moisture. During this time the peanuts are highly susceptible to a number of maladies. These include contamination by molds, more so if the temperature is warm and the humidity very high. It is, therefore, advised that steps be taken to dry peanuts immediately after reaping, whether by natural or artificial means. It is thought that a moisture content of 10% or below reduces drastically most forms of contamination that would have otherwise occurred. Exposure to rain or water after reaping promotes the rapid multiplication of toxic-producing molds, thereby causing contamination.

To ensure good quality peanuts it is generally recommended that the following conditions be observed:

(a) remove moisture slowly at a rate of about 0.5% per hour where mechanical drying is used;

(b) do not dry any portion below 7%, or leave any portion above 10%;

(c) drying should be discontinued (mechanical) when the moisture content gets down to 5.5%, as additional drying occurs during the cooling process;

(d) drying temperature should not exceed 100°F.

Characteristic of Mold Producing Aflatoxin

It is generally accepted that the mold that produces aflatoxin is of tropical origin. Because of this it has been found that it grows best under conditions that are hot (80° - 90°F) and humid. It usually enters the peanut through the shell and progresses to the inner shell, skin and then finally to the cotyledons. Low temperatures and low humidities usually inhibit the growth of the organism. Quite apart from the peanut, the mold may attack other plants in the field. Because of its high toxity food processors usually do not allow any level of tolerance. It has also been found that the toxin is resistant to the mild heat of processing. In view of the fact that the organism producing the toxin is found almost in all peanut-producing areas, it is recommended that all who handle, store, process or use peanuts initiate programmes to prevent or reduce the growth of the organism.

IMPLICATIONS FOR INCREASED PEANUT PRODUCTION

Jamaica is a net importer of peanuts. It is open to speculation as to why local production has not kept abreast of demand over the years. On the surface it would appear that given the competing uses for land, peanut is not nearly as profitable as it could be, either grown in pure stand or in mixed stands with other crops like vegetables, etcetera. Allied to this is the fact that a pure stand system of cropping has traditionally provided the farmers with comparatively now net returns.

The question is, therefore, whether or not the required expansion in peanut production can be achieved under a pure stand system. The fact is that for the most part present acreages are confined essentially to relatively flat lands. The present cost/price structure is such that it does not provide an incentive for increased production. Moreover, economic conditions dictate that these flat lands should be used for crops that will yield the greatest economic advantage to the farmers in particular and to the country in general.

On the other hand rising input prices and unavailability in some instances of critical factor inputs tend to discourage their use altogether, thereby depressing yields considerably, and increasing output unit prices. The end result is that processors find it very uneconomical to use local material.

This leads to questions concerning the strategies which should be adopted for increasing peanut production on an economically viable basis. There is a potential for increasing the crop on flat lands as well as on hilly lands. Appropriate technical packages of practices must be worked out to ensure that suitable measures are pursued and that the application of improved techniques and key inputs will lead to higher yields per acre and reduced prices per unit of production.

All indications point to the fact that farmers will have to look more and more to hillside farming on a mixed cropping basis.

Already there exists enough empirical information on the success of growing peanuts on hillside lands to attract an increasing number of farmers to produce more peanuts on a mixed cropping basis on their hilly lands. Apart from the fact that inter-cropping marginally reduces the plant population, costs of production can be pro-rated among the other crops occupying the land simultaneously with the peanut, thereby reducing unit costs and increasing net revenue.

With respect to marketing arrangements, given an overall increase in yield, this should not present a problem. The fact is that current levels of production cannot support local demands either for processors or the fresh market, so that it would appear that in the immediate future there will be no need for elaborate market adjustments. Further down the road, and assuming that production becomes less centralized, there will be need for collective drying, storing, and possibly marketing. It is not far-fetched to think that such an arrangement could fit into the proposed market service centres of the Ministry of Agriculture's market rationalization programme. These centres as proposed would allow for collective grading, packaging, and wholesaling of farmers' products, either to the proposed 4 sub-terminal markets strategically located around the Island, or to the other large-scale buyers like the processors.

Probably the most critical area in relation to expansion of production is the area of drying and storage. Apart from the need to conserve energy by relying more on a natural means (sunlight) there is the added problem of securing the right moisture content thereby safeguarding against aflatoxin producing molds. It stands to reason, therefore, that while production can be carried out on small acreages, employing a system of inter-cropping, post-harvest operations like drying, storing and marketing become more economically viable when done on a cooperative basis.

Demand Creating Activities

It was pointed out earlier that the peanut is probably one of the most versatile agricultural crops today, having been used in the manufacture of over 300 industrial and food products. While land mass and levels of

production certainly could not provide the scope for the production of this quantity of raw material, surely it is not inconceivable to think that as production increases, there will be need to exploit the versatility of this crop.

One is mindful of the fact that in our domestic situation the first priority should be that of satisfying the raw material demand for processed and salted nuts. In addition, while we recognise the potential of peanuts as a raw material for industrial uses, it is clear that our efforts should be geared towards using the nut more widely in food formulations, given its abundance in proteins. Food products that come to mind immediately are peanut butter and peanut oil.

In any event it is clear that the potential of the crop both as a money earner (local and foreign) and as a source of high protein is not fully appreciated, so that future development efforts must be associated with activities that will increase the demand for the crop.

Chapter IV

MARKETING PEANUTS IN JAMAICA

Probably one of the major factors that has inhibited growth and development of the peanut industry in Jamaica is the lack of adequate market organization. This statement seems paradoxical in light of the fact that Jamaica is a net importer of peanuts. One should, however, recognise the fact that with respect to production and marketing, one complements the other, so that if the infrastructural arrangments that will ensure orderly marketing are not in place, the incentive to produce or indeed to increase production might not be forthcoming. This is not to say that structural improvements alone will ensure reasonable levels of production. In addition, one would want to see certain parameters which will dictate the rules of the game - or simply put, will influence market conduct.

Conversely, it stands to reason that the lack of an orderly marketing system in Jamaica did not evolve because the low levels of production in the country could not support a more sophisticated organization.

In any event some sort of marketing system does exist for peanuts and it is the purpose of this section of the report to examine this system to see how it has influenced the low levels of peanut production in the country, and more importantly to examine the implications of increased production on the present system in the short and medium term, and to make recommendations for long term improvement.

Current Methods of Peanut Marketing

The low level of peanut technology in Jamaica has given rise to a very simple system of marketing. Currently the main outlets for domestically produced peanuts are:

(i) higglers
(ii) the Agricultural Marketing Corporation, and
(iii) processors

First it might be worthwhile to examine the various uses made by peanuts produced locally. Peanuts are produced locally for the fresh market or alternatively for the processing trade. With respect to processing the emphasis is on baked, salted nuts in tins or bottles, or in collephane packages. A limited amount of peanut butter has been made locally, but for the most part the quantities are insignificant.

Higglers, therefore, are the recipients of the major portion of domestic peanuts. The marketing arrangements here are not unlike those of other agricultural commodities, for example vegetables. At time of reaping higglers converge on the main producing areas, and on the basis of personal contact with farmers purchases are made, at farm-gate.

It is not uncommon to find higglers even assisting in reaping and/or drying operations, more so in periods of short supply when the competition becomes even greater. Purchases are then taken back chiefly to metroploitan areas where repackaging takes place into smaller units and then retailed to peddlers of salted peanuts. One should note that a higgler may be the farmer himself, or his wife or relative, or in most cases someone from outside the producing area.

On the other hand a cooperative approach is taken with respect to peanut marketing. In this case, a number of peanut farmers in a geographical area pool their peanuts for reaping and market collectively. In this kind of arrangement the major outlets were either the Agriculturtural Marketing Corporation or food processors. While this is probably the most desirable approach to employ in terms of time, cost and efficiency, regrettably, it is not the most successful. This is due to the fact that the demand for peanuts locally has historically outstripped supply. Related to this is the fact that the fresh market is capable of utilizing almost all of domestic production. Against this background higglers, being the shrewd business people they are, are usually willing to pay prices over and above that considered to be fair market prices, so that individual competitors do not need to be prodded too much into entering "over the fence" transactions.

However, production locally has not responded favourably to market signals for increasing production. Much of this stagnation can be attributed to the fact that local processors have over the years shown a distinct preference and indeed have opted for the imported raw material for reasons that were in part economic and in part technical. Economic because the price of imported peanuts has always been significantly lower than that of locally produced peanuts. Quite apart from being cheaper, processors argued that the quality was better, the size of the nuts more compatible with processing requirements, and there was less contamination.

A number of facts will in the short run prevent production from reaching the point where large scale exports can be accommodated. Nevertheless, Table 7 gives a good idea of the potential for exports within the CARICOM region.

The incidence of Aflatoxin and higher costs were probably the two major factors that have influenced processors' reluctance in purchasing requirement from locally produced peanuts. High cost can be attributed to low productivity and high cost of inputs, while on the other hand the incidence of Aflatoxin can be attributed to unfavourable drying conditions that give rise to the Aflatoxin producing mold.

Having tried to give a brief overview of how the system works, one might then ask what influence has such a system on price and post-harvest losses.

Prices

It is generally conceded that the average level of all farm prices is basically determined by the conditions of the economy as a whole. Similarly, it is agreed that the total of all agricultural production varies very little from year to year. However, there is significantly more variation from year to year among individual commodities.

In the case of peanuts, price variation is not as common or violent as with other crops. The fact is that peanuts have a relatively long shell life when stored under the right conditions. What tends to happen under local conditions is that a few large farmers store their crop at the time of reaping, waiting for the higher price that usually accompanies the off-season. The collective result of these individual actions is that even when the crop is off-season, because all peanuts produced are not released on the market at the same time, prices are artificially high. When this peanut is later released on the market during the off-season, prices are even artificially higher. It would seem, therefore, that while there is no violent fluctuation in price the tendency of the industry to overcome this high price image can only be reversed by significantly increasing production at the national level.

Table 7: Estimated Supply and Demand Pattern for Peanuts In the Larger Countries of the Caribbean Area.

Country and Year	Area of Peanuts (acres)	Yield lb/acre	Production (lb)	Consumption (lb)	Surplus or (Deficit)(lb)
Barbados					
1974	130	1,600	208,000	824,500	(616,500)
1978	1,900	1,900	3,600,000	1,002,000	2,598,000
Trinidad					
1974	-	-	-	4,599,300	(4,599,300)
1978	-	-	-	6,203,000	(6,203,000)
Jamaica					
1974	2,243	960	2,153,000	4,062,600	(1,909,600)
1978	3,000	1,000	3,000,000	4,938,000	(1,938,000)
Guyana					
1974	251	1,048	263,000	1,209,500	(946,500)
1978	1,000	1,500	1,500,000	1,470,000	30,000
Total 4 Countries					
1974	2,624	-	2,624,000	10,695,9900	(8,031,900)
1978	5,900	-	8,100,000	13,613,000	(5,513,000

Source: CARICOM Secretariat

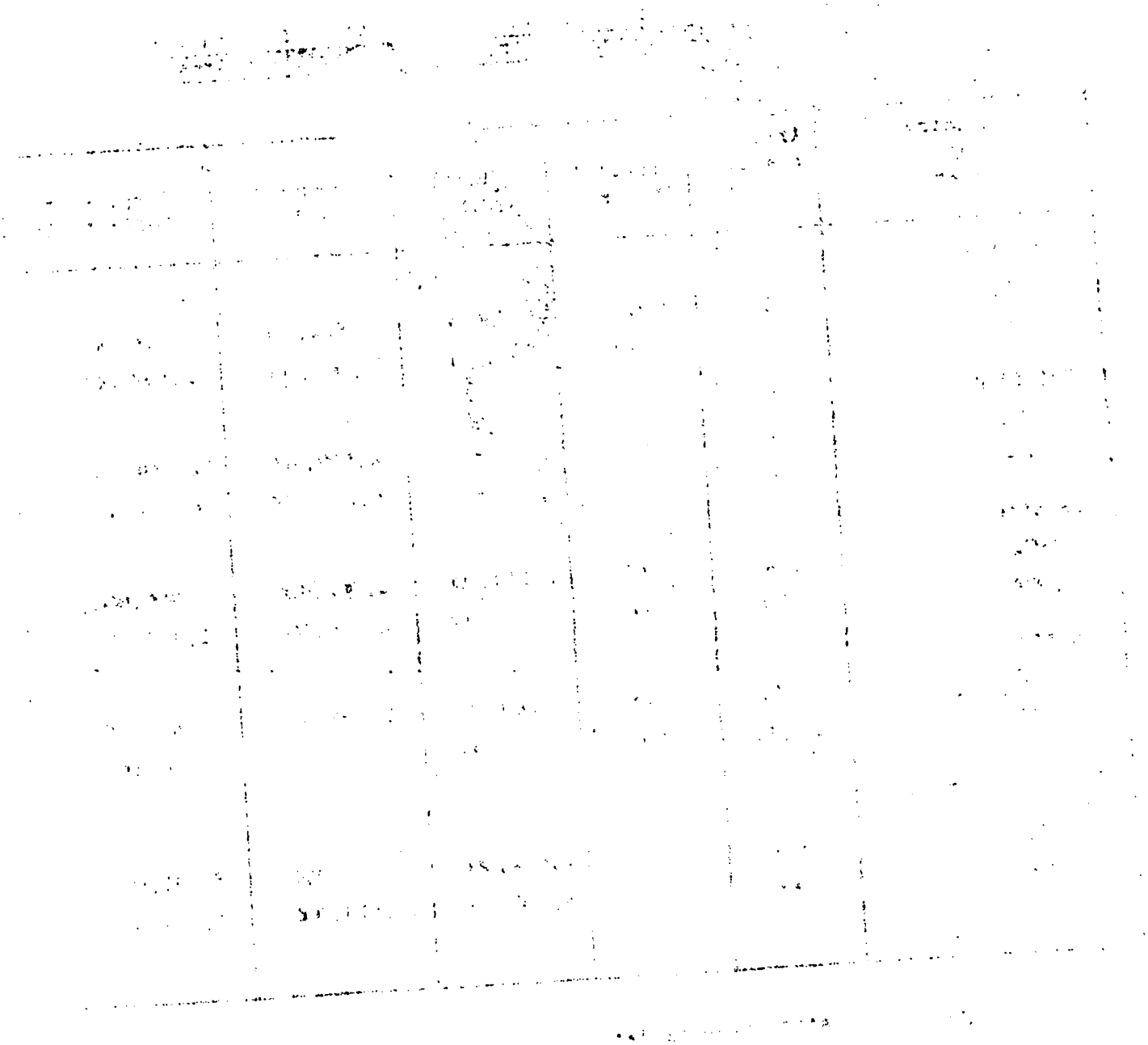


Table 8: Peanut Production and Import

1971 - 1978

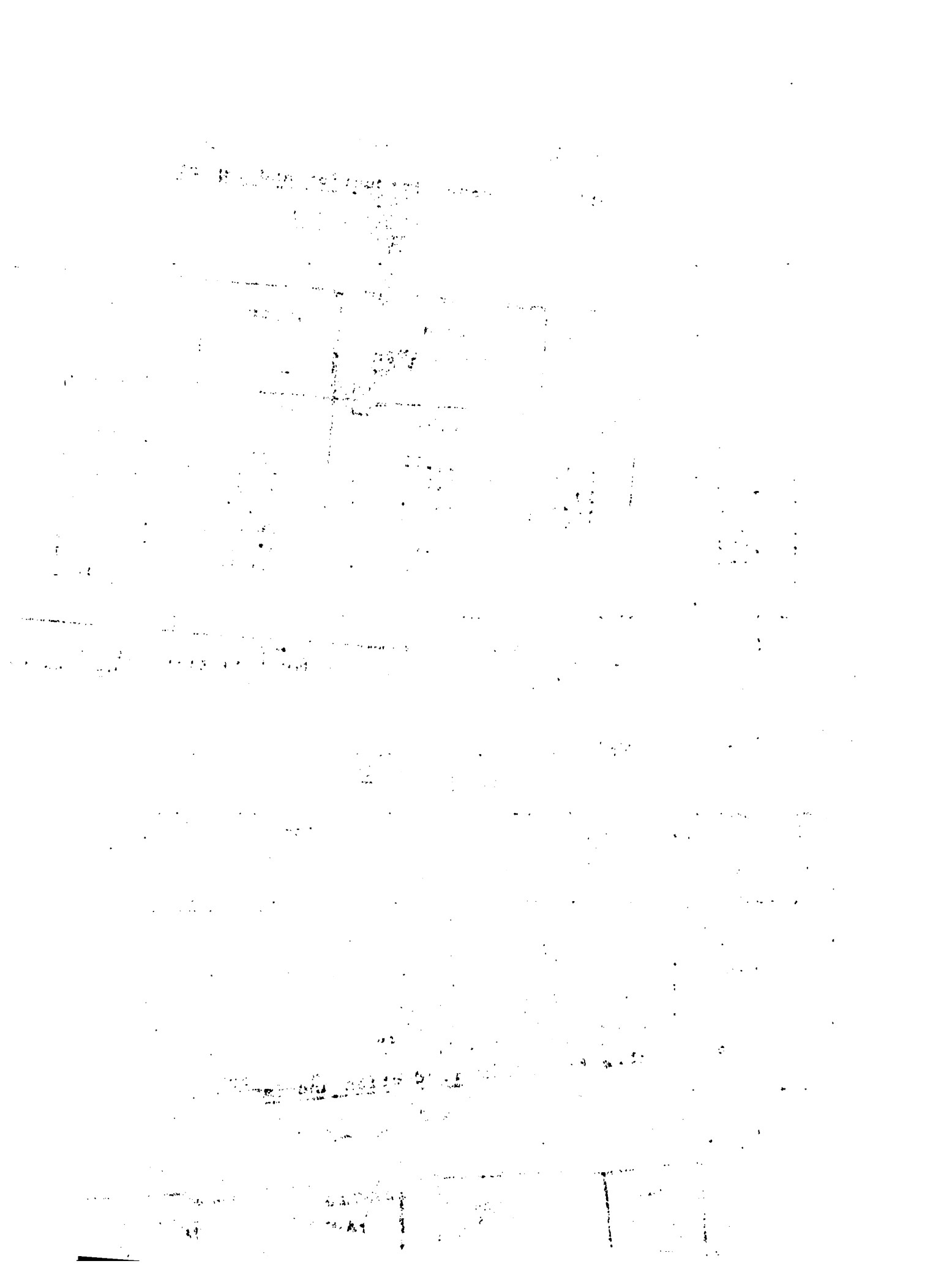
Year	Local Production	Import	Total '000 lb.
	(lb)	(lb)	
1971	1,272	5.35	1,277.4
1972	1,083	102.30	1,185.3
1973	1,192	1,505.20	2,697.2
1974	1,524	996.70	2,516.7
1975	1,160	1,401.00	2,561.0
1976	1,020	1,222.10	2,242.1
1977	4,066	20.10	4,086.1
1978	4,532	42.00	4,574.0

Source: Data Bank, Ministry of Agriculture
Department of Statistics - Production Statistics
1977 - 78.

Table 9: Peanut Import 1971 - 1978

Year	Quantity (lb)	Value $	Import Unit Cost	Local Cost per lb.
			(¢)	
1971	5,350	702	13	n.a.
1972	102,274	17,885	17	n.a.
1973	1,505,216	418,644	28	28¢
1974	996,770	371,188	37	37¢
1975	1,400,934	438,458	31	42¢
1976	1,222,089	380,993	32	43¢

Source: Data Bank, Ministry of Agriculture



NUTRITIVE VALUE OF PEANUT

The need for greater peanut production and consumption in Third World countries like Jamaica is only parallelled by the urgency with which these countries need to increase per capita protein intake.

Peanuts are essentially high in calories, due primarily to the high protein and fat content. It has been estimated that one pound of salted peanut or peanut butter contains approximately 2,800 calories. Processors, in an effort to reduce the caloric content of peanuts, sometimes remove up to 80% of the oil and add carbohydrates with fewer calories.

The protein content is estimated as being about 26% with the meal running almost twice as high. Yet it has also been observed that the greater nutritional weakness in peanut protein is the absence of two essential amino insofar as humans are concerned. These are bysine and methionine.

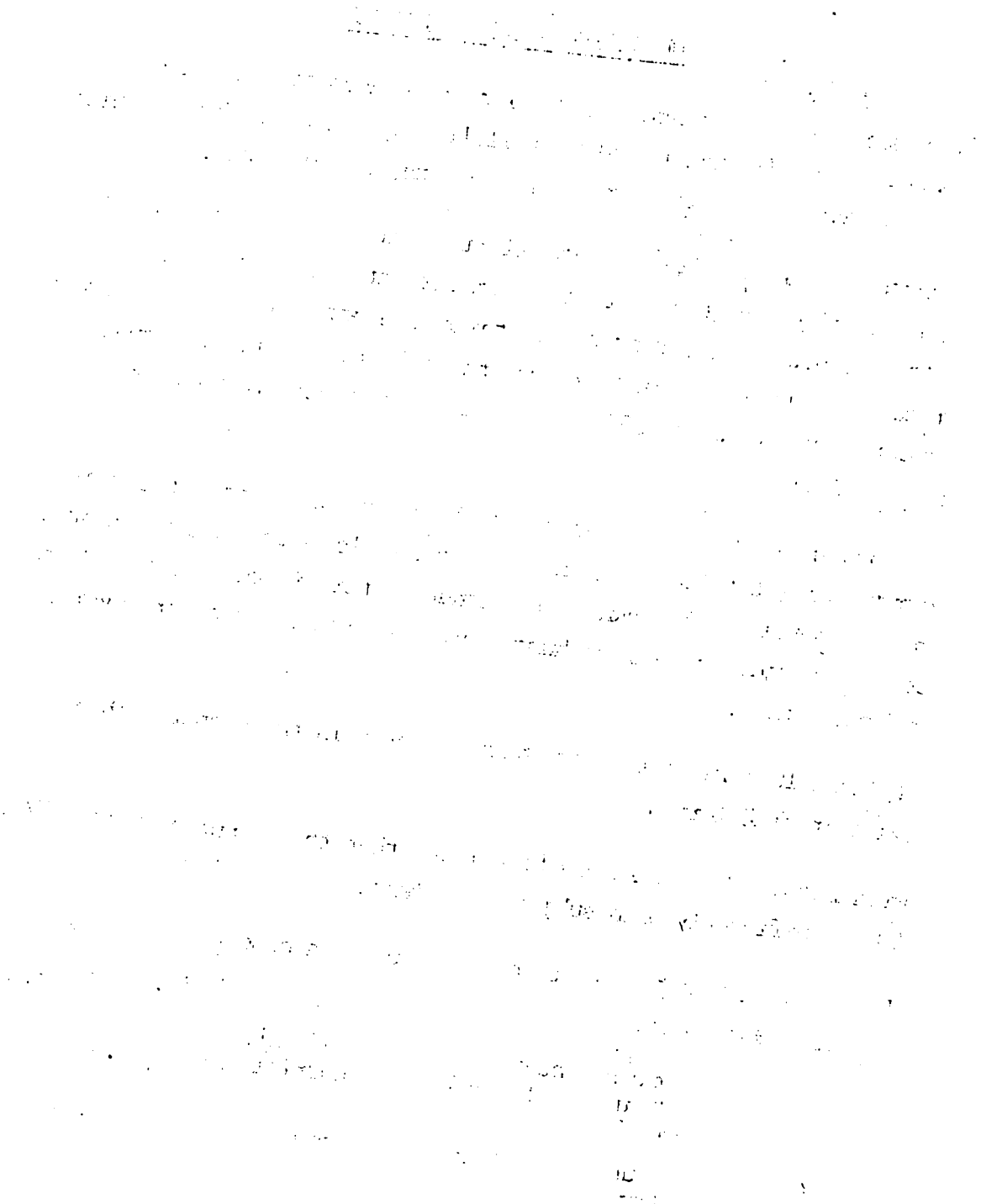
At least 16 amino acids have been isolated in the peanut. These exist in free form.

With respect to oil it has been found that the peanut contains 47% to 50% significantly when subjected to heat.

In the United States, tests carried out on a number of varieties of peanuts showed that -

(a) peanuts contain from 45 - 49% oil. These oils are made up of at least eight nutritionally essential fatty acids; and

(b) peanut oil contains an estimated 76-82% unsaturated fatty acids.

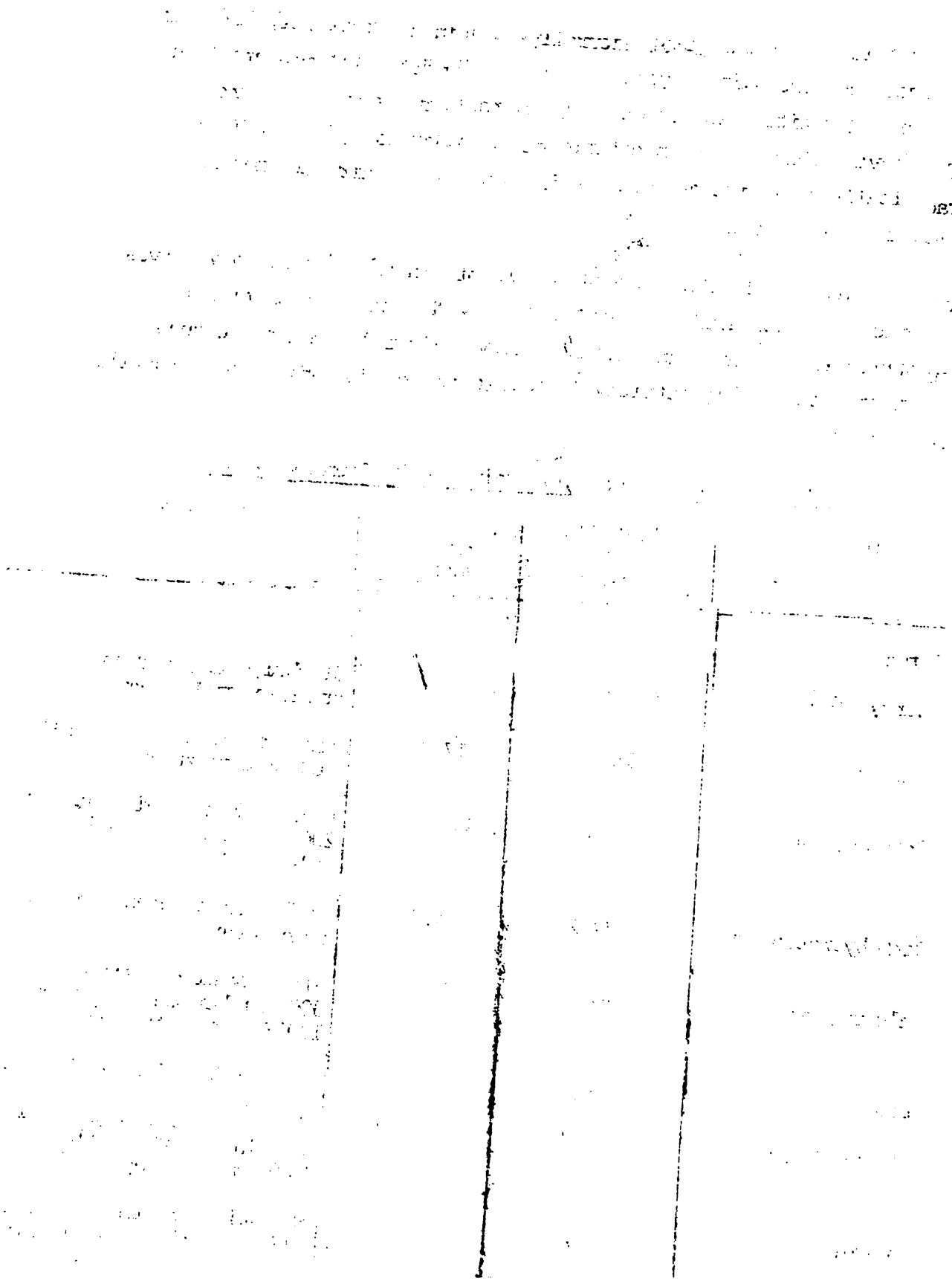


The cotyledons of the peanut naturally contain approximately 18% carbohydrates and the skin about 1%. On the other hand vitamins are found in large quantities in peanuts. The kernels are very good sources of riboflavin, thiamin, and nicotinic acid. Vitamins A, C, and D are practically non-existent, when on the other hand fair quantities of Vitamin E are found.

The presence of all these essential elements in the peanut only serves to underscore the need for increased production and consumption in countries like Jamaica and indeed wherever it can be grown, because apart from its highly nutritive value, it is probably the most versatile crop grown on the farm.

Table: No. 10 Nutritive Value of One Pound Product

Item	Unshelled Roasted Peanuts	Peanut Butter	Remarks
Refuse	28	0	
Energy, cal	1,961	2,808	Slightly higher than steak or smoked ham
Fat, gm	144.5	217.0	Equal to smoked ham - 10% higher than steak
Protein, gm	88.0	118.5	Practically as high as ham 200% higher than whole milk or whole eggs
Carbohydrates, g			
Calcium, mg			
Iron,			
Ri			



SUMMARY & CONCLUSION

The limited nature of prime land in Jamaica along with the competing uses for the land make it mandatory and indeed sensible that these lands should be brought into cultivation utilizing those crops that will bring greatest economic benefit to the farmer in particular, and to the country as a whole.

Against this background it is going to become increasingly important that crops that yield lower net returns be relegated to those lands that are not nearly as productive.

In the case of peanuts the analysis has shown that the crop planted by itself is not nearly as profitable as it could be had it been planted with other crops under hillside conditions. In the model used in the study, peanuts and irish potatoes were used to intercrop yam. Significant reductions in costs were achieved because the model afforded an opportunity for some costs to be shared among the crops. In the special case of peanuts, intercropping also afforded an opportunity for cost reductions in terms of fertilizer usage.

The study pointed out the importance of uniform drying and the attainment of the right moisture content if shelf life was to be increased, and the incidence of Aflatoxin reduced. A cooperative approach to post-harvest handling is recommended, moreso in the areas of drying and marketing. Natural drying will, of necessity, be the type used as the cost of fuel makes artificial techniques more expensive.

A significant increase in peanut production will not create undue dislocation in the marketing system, moreso if cooperative marketing is employed, since the system is relatively simple, comprising primarily higglers, the Agricultural Marketing Corporation, and a number of processors.

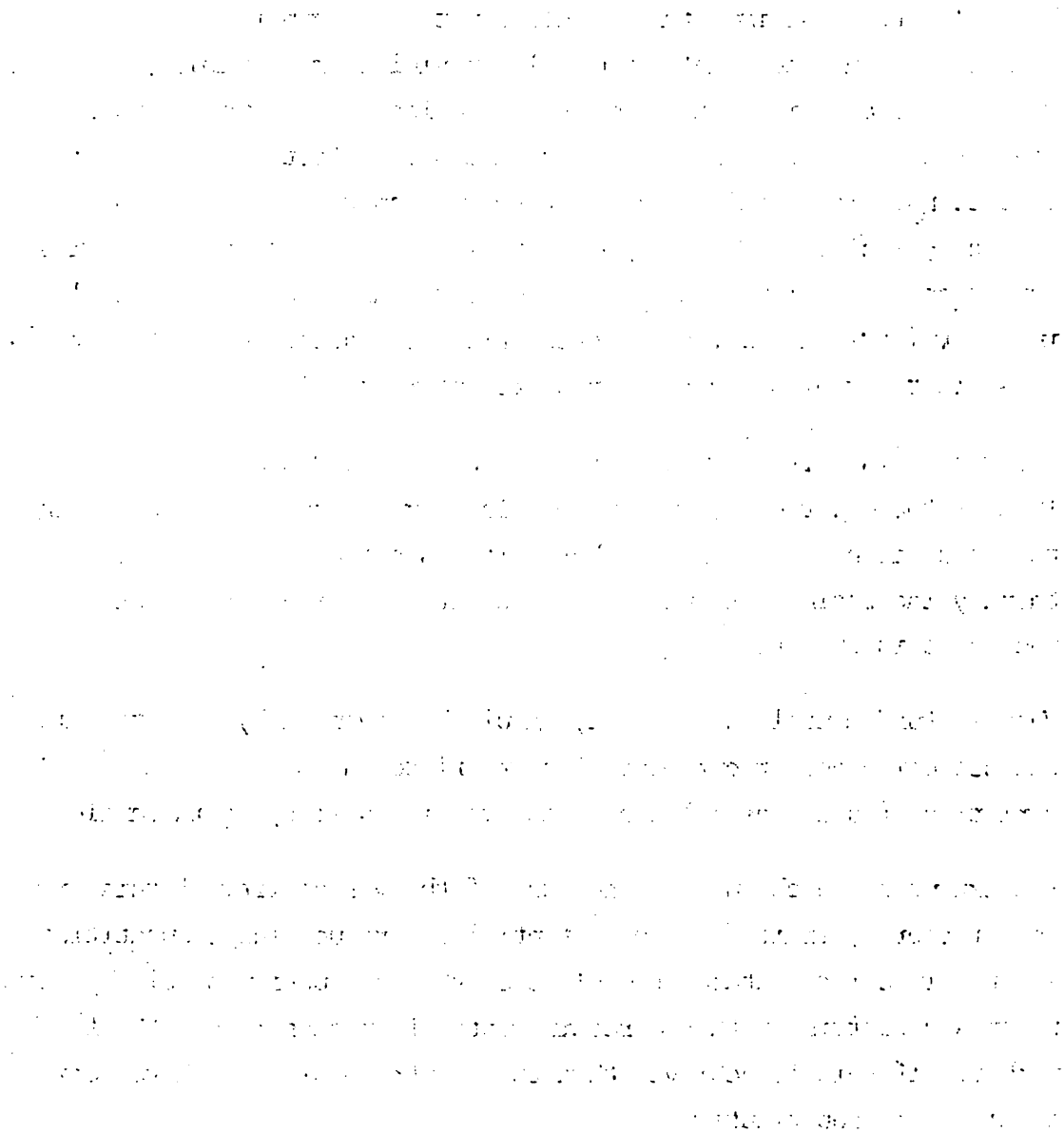
There needs to be greater emphasis placed on research and indeed the dissemination of research findings.

Probably the most important conclusion to be drawn from the exercise is the fact that even if lower yields are obtained, as might well be the case in certain areas of Jamaica, the reduction in costs given the inter-cropping model, is enough to offset reasonable yield reductions. The model has in fact shown peanuts to be a worthwhile and economically feasible crop under hillside conditions, as against pure stand situations where in any case the high quality of the land in the traditional producing acres arises the questions of the crop's feasibility even in a situation where inter-cropping is employed.

The model also permits more intensive use of land since during the life of the major crop, one or two minor crops can be obtained. In this case it has been proven that unit costs tend to be reduced, thereby increasing net income, even under conditions of modest increases in the price of output.

What is fundamental and probably should be given early attention is the selection and procurement of appropriate and more adaptable varieties of seeds as relates to the varying soil types in Jamaica.

The extent to which one can make use of the versatility of this crop is, of course, limited by our potential to produce large quantities. For the immediate future it would seem that production should be geared towards satisfying both the requirements of processors and the fresh market. If this is achieved then the country would also have achieved total import substitution.



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