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PROGRAMME OF WORK TO ESTABLISH GUIDELINES FOR THE
EFFECTIVE ADMINISTRATION, OPERATION AND MAINTENANCE OF
THE IRRIGATION AND DRAINAGE DISTRICT IN THE BRUMDEC PROJECT

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Caracas, Venezuela

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**PROGRAMME OF WORK TO ESTABLISH GUIDELINES FOR THE
EFFECTIVE ADMINISTRATION, OPERATION AND MAINTENANCE OF
THE IRRIGATION AND DRAINAGE DISTRICT IN THE BRUMDEC PROJECT**

by
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PROGRAMME OF WORK TO ESTABLISH GUIDELINES FOR THE
EFFECTIVE ADMINISTRATION, OPERATION AND MAINTENANCE OF THE IRRIGATION
AND DRAINAGE DISTRICT IN THE BRUMDEC PROJECT
ST. ELIZABETH, JAMAICA

1. INTRODUCTION

The writer has reviewed the available documentation of the irrigation and drainage system proposed for the BRUMDEC Project. Complete descriptions of the Project area and its potential for development are documented elsewhere. (1,2,3)

This programme of work is submitted in accordance with the Agreement between the Black River Upper Morass Development Company Limited (BRUMDEC) and the Inter-American Institute for Cooperation on Agriculture (IICA). The programme of work aims at establishing whether or not additional water-control structures will be needed to effectively control irrigation and drainage for different types of crops in the Project area, and also for the preservation of the peat soil.

As a part of the Final Report, the writer will recommend an internal organization structure and a budget for the administration, operation and maintenance of the irrigation and drainage system, and set up guidelines for the practical operation and maintenance of the system.

A chronogram of activities is given in Appendix I.

2. OBJECTIVES

The proposed programme of work has as its objectives:

2.1 To establish whether or not additional water-control structures are needed to supplement the proposed irrigation and drainage system for the cultivation of different types of crops in the Project area, and for the preservation of the peat soil.

2.2 To set up guidelines for the practical operation and maintenance of the irrigation and drainage system in the project area.

the first half of the 19th century, and the second half of the 19th century, and the first half of the 20th century, and the second half of the 20th century.

It is difficult to imagine a more appropriate way to begin a study of Latin American history than by examining the political, social, and economic development of the continent during these four periods. This is because each period represents a distinct phase in the history of Latin America, characterized by its own unique set of challenges and opportunities.

The first period, from the early 19th century to the mid-19th century, was a time of independence movements. During this period, many countries in Latin America gained their independence from Spain and Portugal. This was a period of great political change, as new governments were established and old ones were overthrown. It was also a period of social and economic transformation, as new industries were developed and old ones declined.

The second period, from the mid-19th century to the early 20th century, was a time of consolidation and expansion. During this period, many countries in Latin America established stable governments and began to develop their economies. They also expanded their territories through colonization and annexation.

The third period, from the early 20th century to the mid-20th century, was a time of political instability and social unrest. During this period, many countries in Latin America experienced military coups and revolutions. They also faced challenges from external powers, such as the United States and the Soviet Union.

The fourth period, from the mid-20th century to the present day, has been characterized by political and economic globalization. During this period, many countries in Latin America have adopted free-market policies and opened their economies to international trade. They have also faced challenges from global forces, such as climate change and technological advancements.

In conclusion, the history of Latin America is a complex and fascinating story. It is a story of political, social, and economic development, of independence movements, of consolidation and expansion, of political instability and social unrest, and of political and economic globalization. It is a story that continues to unfold today, as Latin America continues to evolve and adapt to the challenges of the modern world.

- 2.3 To use information generated in accomplishing 2.1 and 2.2 to recommend an internal organization structure for the administration, operation, and maintenance of the system and for preparation of a budget based on that organization structure.
- 2.4 To train national technicians in the supervisory management of the system.

3. STRATEGY

To achieve the objectives during the period of this consultancy the following strategy will be adopted:

- 3.1 The relationship between water-table, rainfall, level of water in rivers, irrigation canals and drains will be studied to provide data for the achievement of objectives 2.1 and 2.2.
- 3.2 The infiltration characteristics of each soil type in the project area will be studied to provide data relevant to achieving 2.1 and 2.2.
- 3.3 The hydraulic sections of drains and canals will be calibrated to relate the discharge with the water level.
- 3.4 The siltation of drains will be monitored to provide information on maintenance requirements.
- 3.5 A training course for national technicians will be carried out to highlight the practical aspects of the operation and drainage system.

4. METHODOLOGY

- 4.1 With reference to 3.1, the water-table fluctuations will be measured by using observation wells. Details of an observation well are presented in Figure 1. Simultaneously, we will also measure drainage discharge, water levels in drains and canals, and rainfall, in order to study the relationship between these variables.

the following day. The first two days were spent in the field, and the third day was spent in the laboratory. The fourth day was spent in the field, and the fifth day was spent in the laboratory.

The following is a summary of the results obtained.

RESULTS

1. Effect of Temperature on the Growth of *Candida*

The effect of temperature on the growth of *Candida* was determined by growing the yeast at various temperatures.

The results show that the growth of *Candida* is inhibited at temperatures above 30°C. and that it is stimulated at temperatures below 20°C. The optimum temperature for growth is approximately 25°C.

The results also show that the growth of *Candida* is inhibited at temperatures below 10°C. and that it is stimulated at temperatures above 20°C. The optimum temperature for growth is approximately 25°C.

The results also show that the growth of *Candida* is inhibited at temperatures above 30°C. and that it is stimulated at temperatures below 20°C. The optimum temperature for growth is approximately 25°C.

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The results also show that the growth of *Candida* is inhibited at temperatures below 10°C. and that it is stimulated at temperatures above 20°C. The optimum temperature for growth is approximately 25°C.

It is concluded that the optimum temperature for growth of *Candida* is approximately 25°C.

4.2 Infiltration characteristics of the different soils in the project area will be measured in the field using appropriate apparatus to determine cumulative infiltration and the infiltration rate of each soil type.

4.3 The discharge from irrigation canals and drains will be determined by measuring the area of hydraulic cross section and the mean velocity of the flow.

4.4 The bottom level of drains will be measured after appropriate time intervals to provide data for calculating siltation rates. This data will also be used as the basis for estimating drain maintenance costs.

4.5 The budget for the administration, operation, and maintenance of the system will be determined from the data collected during the implementation of this programme of work. The recommendation of a tariff will be integrated in the budget.

4.6 On the basis of the design of the drainage and irrigation system and on any recommendations which the writer may make for supplementary water-control structures, a recommendation will be made for an internal organization structure to provide for the effective operation and maintenance of the irrigation and drainage system.

4.7 The training course will be concerned with the practical aspects of the operation and maintenance of the irrigation and drainage system. The training aids will be the field studies envisaged at 4.1 through 4.4.

5. EQUIPMENT AND PERSONNEL

Equipment and personnel needed for implementation of this programme are listed in Appendix II.

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2. HARZA OVERSEAS ENGINEERING COMPANY and HUE LYEW CHIN. 1977 Black River Upper Morass Feasibility Report. 3 Vols.
3. HARZA OVERSEAS ENGINEERING COMPANY and HUE LYEW CHIN. 1980. Technical and Economical Justification Black River Upper Morass Irrigation Project.

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and the corresponding values of α and β are given in Table I. The values of α and β are plotted in Fig. 1. The values of α and β are plotted in Fig. 1. The values of α and β are plotted in Fig. 1. The values of α and β are plotted in Fig. 1.

APPENDIX 1

CHRONOGRAM FOR THE IRRIGATION AND DRAINAGE PROGRAMME

ACTIVITY	JUNE	JULY	AUG.	SEPT.
Review of documents relevant to the drainage and irrigation system of the Project, and preparation of the programme of work.				
Recommendation of an irrigation scheme.				
Study of relationship between water-table in fields, water level of irrigation & drainage canals, and rainfall.				
Study of infiltration characteristics of different soil types in the Project.				
Study of discharge rates of irrigation and drainage canals.				
Study of siltation of drainage canals.				
Preparation of budget and recommendation for internal organization structure for the administration, operation, and maintenance of the irrigation and drainage system of the Project.				
Training Course				
Final Report				

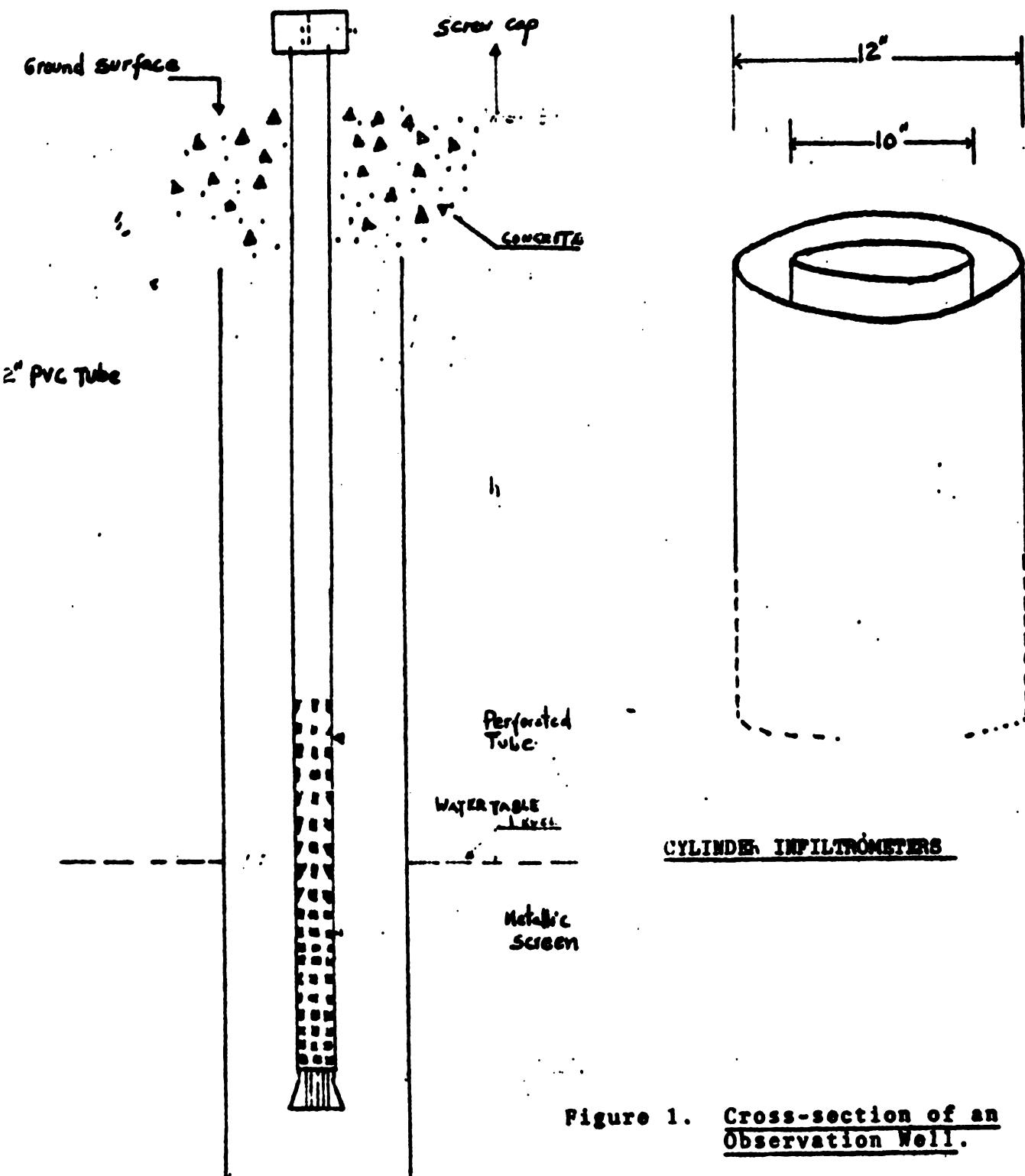


Figure 1. Cross-section of an Observation Well.

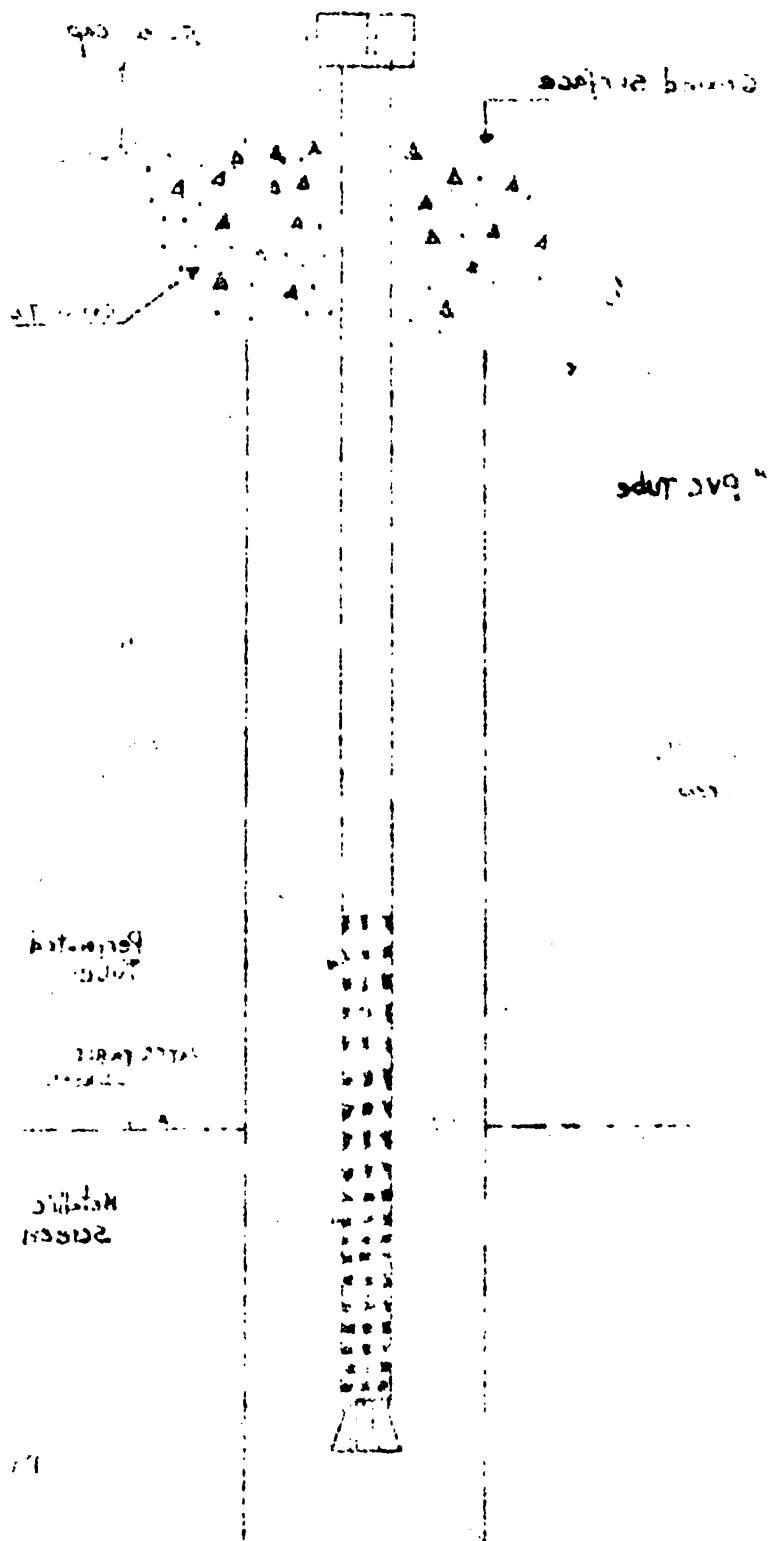
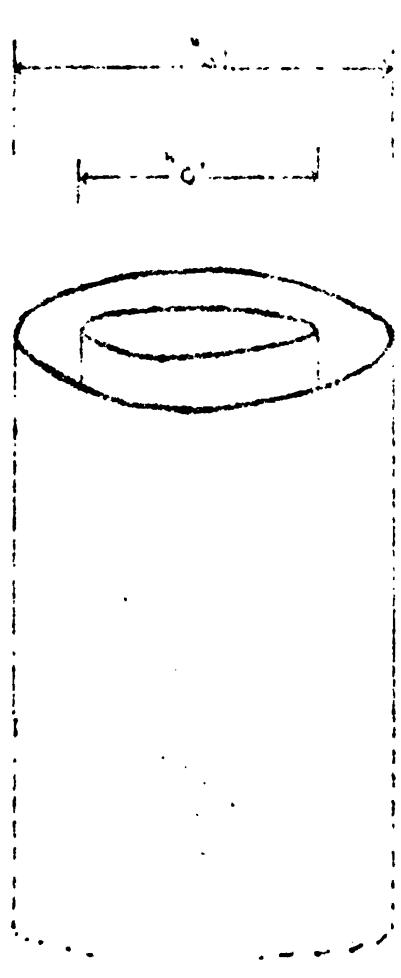
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טראם צדקה

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APPENDIX II

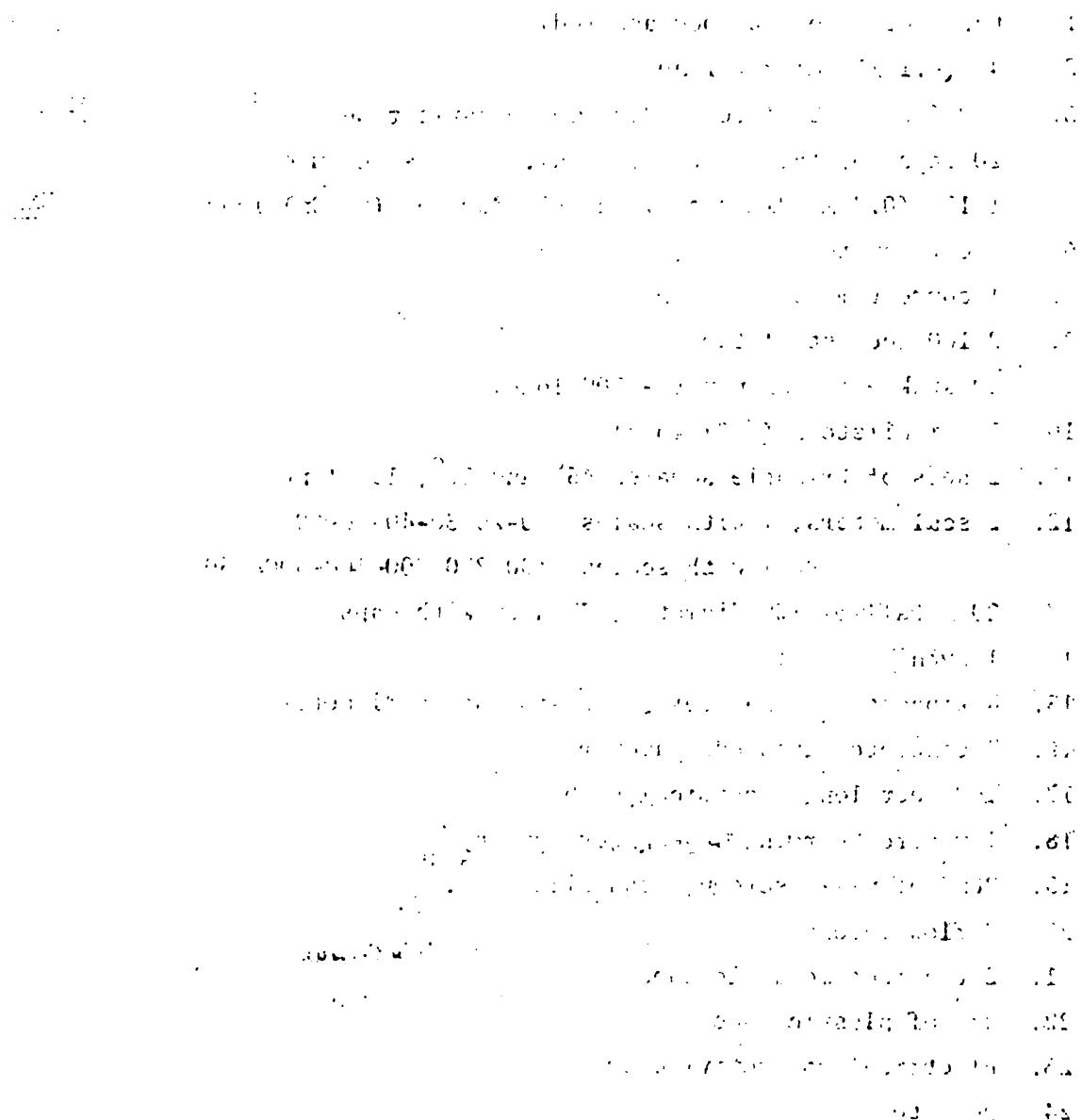
EQUIPMENT NEEDED FOR THE IRRIGATION AND DRAINAGE PROGRAMME

1. Engineer level (tripod and rod)
2. 4" (0.10m) diameter auger
3. 500 feet of 2" (0.05m) diameter plastic tube
4. 20 caps for the 2" (0.05m) diameter plastic tube
5. 1 12" (0.30m) diameter iron cylinder 16" (0.40m) long
6. 1 chronometer
7. 1 current meter
8. 2 100 feet steel tapes
9. 20 stakes (1" diameter - 10" long)
10. 10 limnimeters (1.0m long)
11. 2 sets of triangle squares 45° and 30°, 12" long
12. 2 scaleometers, 1 with scales: 10-20-30-40-50-60
 1 with scales: 100-250-300-400-500-750
13. 20 metal cups 3" diameter, 3" deep with caps
14. 1 oven
15. 4 siphons, 2" diameter and 2 siphons 4" diameter
16. 4 concrete tubes 6" diameter
17. 100 feet long electrical probe
18. 1 recording rain gauge (Pluviograph)
19. 20m² of metal screen, mesh size 1mm².
20. 3 flow-meters
21. 2 ten feet metallic tape
22. 5m² of plastic sheet
23. Electrical conductivimeter
24. pH meter

RESULTS

Effect of the initial concentration

The effect of the initial concentration of the reactants on the rate of the reaction was studied by varying the initial concentration of the reactants.



**PERSONNEL REQUIREMENT FOR THE IRRIGATION
AND DRAINAGE PROGRAMME**

1. Two (2) technicians for the topographical survey, water table observations, flow measurements and irrigation and drainage assistance.
2. Four (4) labourers for the field work.
3. One (1) irrigation and drainage engineer (counterpart)

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Section	Text	Page
1	Introduction	1
2	Background	2
3	Methodology	3
4	Results	4
5	Conclusion	5
6	References	6

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1. What is the name of the author?
John Milton

2. What is the title of the work?
Paradise Lost

3. What is the date of publication?
1667

4. What is the subject matter?
The Fall of Man

5. What is the style of the work?
Dramatic

6. What is the language used?
English

7. What is the genre?
Mythological

8. What is the plot?
The story of Adam and Eve's fall from grace.

9. What are the main characters?
Adam, Eve, Lucifer, God, Satan, Raphael, Michael, Uriel, Gabriel, Azrael, and others.

10. What is the setting?
Heaven, Hell, and Earth.

11. What is the theme?
The nature of free will, the consequences of sin, and the nature of God.

12. What is the style of writing?
Blank verse, heroic couplets, and prose.

13. What is the tone?
Serious and dramatic.

14. What is the mood?
Mystical and epic.

15. What is the message?
The message is that humans are fallen beings who need salvation through Christ.

16. What is the purpose?
The purpose is to tell the story of the creation of the world and the fall of man.

17. What is the style of the poem?
The style is highly poetical and dramatic.

18. What is the language used in the poem?
The language used is English.

19. What is the genre of the poem?
The genre of the poem is epic.

20. What is the plot of the poem?
The plot of the poem is the story of the creation of the world and the fall of man.

(vi)

- No. V - 15 D. G. Hutton, A. H. Wahab and J. Dehaney, "Investigating Critical Levels of Dry Rotting of Yellow Yam (Dioscorea Cayenensis) Planting Material, the Benefits of Disinfecting the Heads of Pratylenchus Coffeae and of After-Planting Nematicide Treatments", September 1981
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PM-305

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establish guidelines
for the effective...

Autor

Título

Fecha
Devolución

Nombre del solicitante

DOCUMENTO
MICROFILMADO

Fecha: 21 Dic 1982