

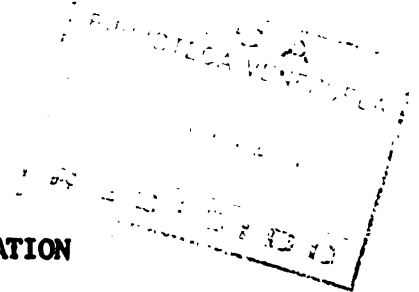
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RECOMMENDATIONS FOR LAND USE AND IRRIGATION
NEEDS IN THE BRUMDEC PROJECT

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NEEDS IN THE BRUMDEC PROJECT**

by

**Humberto Pizarro,
Irrigation & Drainage Specialist
IICA/Jamaica**

November, 1981

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RECOMMENDATIONS FOR LAND USE AND IRRIGATION
NEEDS IN THE BRUMDEC PROJECT

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1. Introduction

This report is prepared in response to the request made by Dr. Johnson Masterton at the meeting held between BRUMDEC officials and the IICA Consultants on July 1, 1981, in the office of the Administrative Manager of BRUMDEC.

IICA is required to supply to BRUMDEC a brief report on the following aspects of land use and irrigation requirements:-

- (i) the type of crops which could be grown in the Project area without supplementary irrigation, specifying locations
- (ii) the type of crops which could be grown in the Project area with supplementary irrigation, the volume of supplementary irrigation required, and how such irrigation could be supplied at the least cost.

In this report it is assumed that the estimates of effective rainfall (defined as that part of total annual and seasonal rainfall that is available for crop production), exhibited in Appendix I, based on data from the Santa Cruz Station is valid for the BRUMDEC Project area. The recommendations and conclusions in this report are based on comparisons of the estimates of actual evapotranspiration and the estimates of effective rainfall which provide estimates of soil moisture deficit on a monthly basis.

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A topographical survey of the Project area would provide data that could be used to refine the estimates but the time period set for the provision of this report does not permit for such a survey to be arranged.

2. Crops which may be grown in the Project area without supplementary irrigation

Estimates of actual evapotranspiration of effective rainfall, and of soil moisture deficits are given for several crops in Appendix II. The crops listed hereunder can be grown in the Project area without supplementary irrigation. The growing period is also defined.

(a) On Peat Soil

<u>Crop</u>	<u>Growth Period</u>
Carrot	April - June; September - November
Corn	August - November
Cabbage	September - November
Watermelon	September - November
Onion (green)	April - May; September - October
Onion (bulb)	April - June; September - November

(b) On Mineral Soil

<u>Crop</u>	<u>Growth Period</u>
Corn	August - November
Sorghum	March - June; August - November

3. Crops which may be grown in the Project area with supplementary irrigation to supply the moisture deficit

(a) On Peat Soil

<u>Crop</u>	<u>Growth Period</u>	<u>Moisture Deficit</u>	
		<u>Period</u>	<u>Amount (mm)</u>
Tomato	September - November	November	65
Tomato	April - June	June	154
Lettuce	September - November	November	60
Beans	November - January	December-January	230
Corn	March - June	June	28

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

The second part of the document details the various methods used to collect and analyze the data. It includes a list of the different types of transactions recorded, such as sales, purchases, and transfers. Each method is described in detail, including the steps involved in the process.

The third part of the document provides a summary of the findings and conclusions drawn from the analysis. It highlights the key trends and patterns observed in the data, as well as any potential areas for improvement.

Item	Description	Quantity	Value
1	Office Supplies	10	500
2	Travel Expenses	5	1500
3	Utilities	12	600
4	Insurance	8	4000
5	Salaries	20	20000
6	Equipment	3	15000
7	Repairs	15	7500
8	Advertising	7	3500
9	Interest	18	9000
10	Depreciation	10	5000
11	Provision for Doubtful Debts	5	2500
12	Income Tax	15	7500
13	Dividends	10	5000
14	Retirement	12	6000
15	Charitable Contributions	5	2500
16	Gifts	3	1500
17	Legal Fees	8	4000
18	Professional Fees	10	5000
19	Bank Charges	15	7500
20	Other	10	5000

<u>Crop</u>	<u>Growth Period</u>	<u>Moisture Deficit</u>	
		<u>Period</u>	<u>Amount (mm)</u>
Watermelon	April - June	June	36
Pigeon Pea (local)	January - December	(February (June - July	2.25 186
Rice	March - June	March - April	272
Rice	September - December	November-December	292

(b) On Mineral Soil

<u>Crop</u>	<u>Growth Period</u>	<u>Moisture Deficit</u>	
		<u>Period</u>	<u>Amount (mm)</u>
Corn	March - June	June	28
Peanut	March - June	June	20
Sweet Potato	March - June	April	24
		June	109
Sweet Potato	September-December	November-December	177
Pigeon Peas (local)	January-December	(February (June-July	2.25 186
Sugar Cane	January-December	(January-April	394
		(June-September	418
		(November-December	227
Rice	March - June	March - April	272
Rice	September-December	November-December	292

4. Probability of less than average rainfall occurring

Using the Table C1 of the GRONTMIJ Report ⁽¹⁾ a rough estimate of the probability range within which falls the probability of less than average rainfall occurring has been extracted and is presented in Appendix I. Except for three (3) months of the year - January, April, and October, the probability of less than average rainfall occurring falls between P=0.5 and P=0.75. In Jamaica the probability of less than average rainfall occurring falls between P=0.75 and P=0.90. In April and October the probability of less than average rainfall occurring falls between P=0.25 and P=0.50.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that this is crucial for ensuring transparency and accountability in the organization's operations.

2. The second part of the document outlines the various methods and tools used to collect and analyze data. It highlights the need for consistent data collection procedures and the use of advanced analytical techniques to derive meaningful insights from the data.

3. The third part of the document focuses on the implementation of data-driven decision-making processes. It discusses how data can be used to identify trends, forecast future performance, and optimize resource allocation across different departments and projects.

4. The fourth part of the document addresses the challenges associated with data management and analysis. It identifies common issues such as data quality, integration, and security, and provides strategies to overcome these challenges.

5. The fifth part of the document concludes by summarizing the key findings and recommendations. It stresses the importance of a continuous learning and improvement mindset to stay ahead in a rapidly changing business environment.

6. The sixth part of the document provides a detailed overview of the data collection process, including the identification of data sources, the design of data collection instruments, and the implementation of data collection procedures.

7. The seventh part of the document discusses the various methods used for data analysis, including descriptive statistics, inferential statistics, and regression analysis. It also covers the use of data visualization tools to present the results of the analysis.

8. The eighth part of the document focuses on the application of data analysis results to decision-making. It discusses how data can be used to identify opportunities for growth, optimize operations, and improve customer satisfaction.

9. The ninth part of the document addresses the ethical considerations surrounding data collection and analysis. It discusses the importance of protecting personal data, ensuring transparency, and avoiding bias in the analysis.

10. The tenth part of the document provides a final summary and concludes the report. It reiterates the key findings and recommendations and expresses the hope that the information provided will be helpful to the organization.

5. Surface water resources

A map showing the Black River Upper Morass Surface Water Resources is attached as Appendix III of this report.

6. Conclusion

According to the objective of this study we have arrived at the following conclusions:

- (i) It is possible to cultivate the BRUMDEC lands without having to follow the irrigation scheme proposed by the Consultant (Harza et al).
- (ii) The 0.75 frequency monthly average streamflow from the North Elim River could supply the supplementary irrigation water for 1000 acres.
- (iii) The water from the South Elim River has a higher content of dissolved solids (electrical conductivity 930 micromohs) and it cannot be used unless it is mixed with better quality water.
- (iv) From the Black River water can be taken to irrigate the North Western part of the area. There is no limitation in the amount of water any time of the year.
- (v) For crops of short duration two crops per year could be obtained without irrigation, if sown at the appropriate time during the spring and fall seasons.
- (vi) The amount of water needed every month for irrigation depends on the area to be sowed by a particular crop in a given season.
- (vii) According to the spot level map, there is a convergence slope toward the Grass River Pumping Station. Taking as reference the 2D-1 Drain the land slopes as follows:

In the Northern Part

Left side from West to East up to drain 2D.

Right side from East to West up to drain 2D.

In the Southern Part

(There is a general slope from East to West)

Left side from South to North

Right side from North to South.

- (viii) Water from the Foster and Braes Rivers should be utilized when available.
- (ix) Water could be taken from the Black River at a point upstream from waterfall situated downstream (Newton).
- (x) Another possibility is to place a check dam upstream the meander to raise the water level and to get water to the peat area near the Grass River Pumping Station.
- (xi) An open canal conveying 35.3 cfs ($1\text{m}^3/\text{s}$) will feed the drains 2D-2, 2D-3 and 2D-4. Check dams should operate in the drains to raise the water level to give the water head for the infiltration of water into the peat soil.
- (xii) The existing three water intakes in the North Elim River will be used to divert the stream towards the North Central part of the area.
- (xiii) Water from the Foster River should be taken upstream the Foster Gauging Station to give the water enough elevations to irrigate as much land as possible.

7. Recommendations

- (i) To reduce the irrigation needs, the selected crops should be planted or sowed during the rain seasons, spring and fall when the effective rainfall supplies

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data. The second part covers the process of reconciling bank statements with the company's internal records. This step is crucial for identifying any discrepancies and ensuring that the books are balanced. The third part addresses the need for regular audits to detect any potential errors or fraud. Finally, the document concludes with a summary of the key points and a recommendation to implement these practices as a standard operating procedure for all departments.

the necessary moisture to the soil.

- (ii) Irrigation should be provided for high profitable crops.
- (iii) The diversion structure, the conveyance canals and the irrigation facilities in the North Elim River should be improved to have as much water as possible to irrigate the land.
- (iv) On the land of steeper slope contour furrow for water conservation should be practiced.
- (v) A water table control should be managed permanently in the peat area through the drainage ditches and through the irrigation from the Black River.
- (vi) To irrigate the South Eastern part of the area, it will be necessary to use the underground water or water from the New River.
- (vii) A soil salinity control should be followed permanently in the area irrigated by the North Elim River because of its salt content.
- (viii) A topographic survey with contour lines every foot should be carried out followed by a land levelling to improve the water conservation and the irrigation efficiency.
- (ix) Observation wells should be installed in the area (especially in the Peat area) to monitor the water table fluctuation in space as well as in time.
- (x) To find out the benefits of irrigation, research on the relationship between Productivity and water applied should be conducted.
- (xi) For every type of soil and land slope the appropriate irrigation system should be designed to have a high water application efficiency.

The first part of the document discusses the importance of maintaining accurate records for all transactions. It emphasizes that proper record-keeping is essential for ensuring the integrity and transparency of the financial system. This includes documenting all income, expenses, and assets, as well as providing a clear audit trail for all activities.

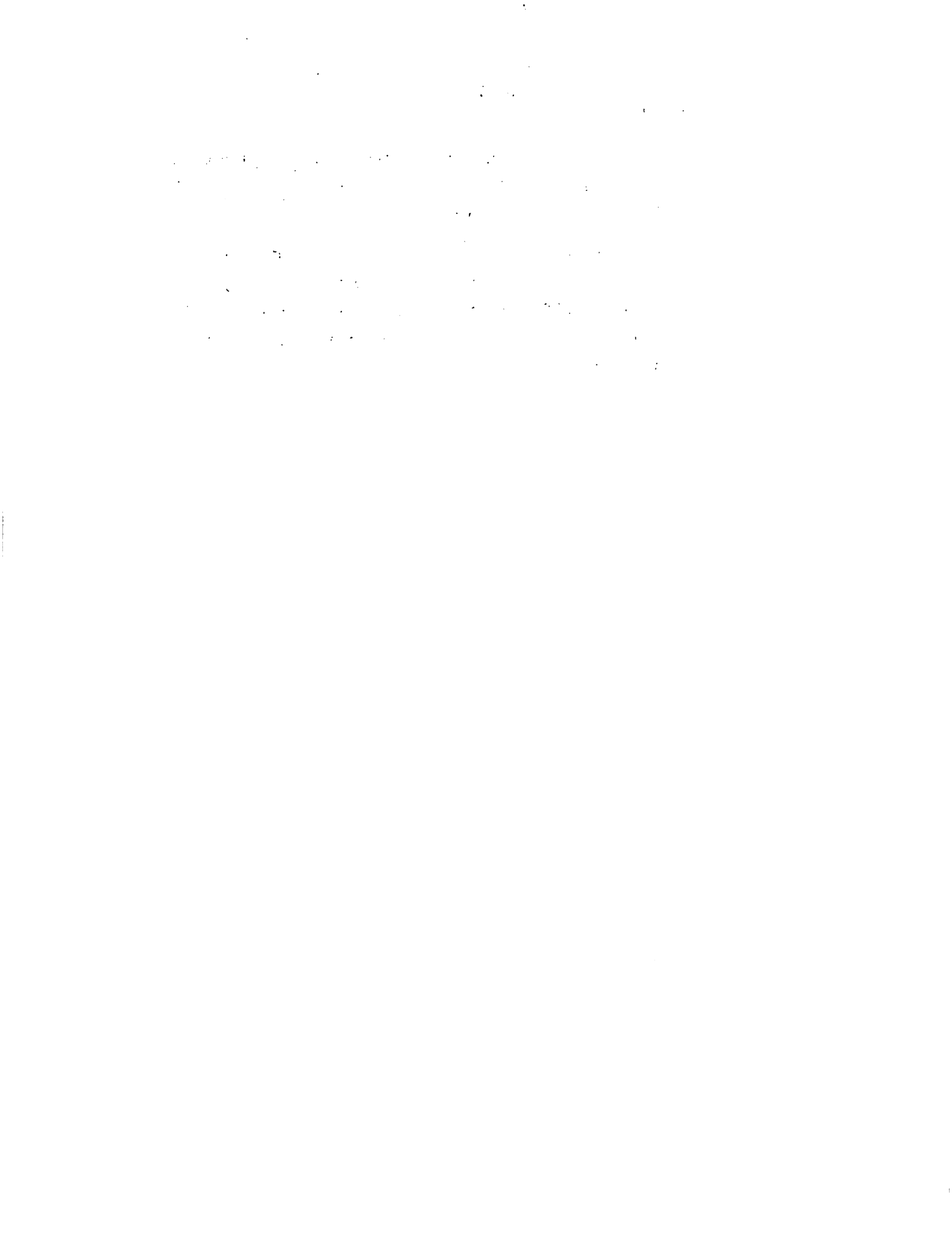
In addition, the document outlines the various methods and tools available for managing financial data. It suggests using specialized software and systems to streamline the recording process and reduce the risk of errors. Regular reviews and updates of records are also recommended to ensure that the information remains current and relevant.

The second part of the document focuses on the legal and regulatory aspects of financial record-keeping. It details the requirements imposed by various government agencies and international bodies, such as the IRS and the OECD. Compliance with these regulations is crucial to avoid penalties and maintain the trust of stakeholders.

Furthermore, the document discusses the role of internal controls and risk management in the context of financial reporting. It highlights the need for robust internal policies and procedures to detect and prevent fraud, as well as to ensure that the financial statements accurately reflect the organization's performance.

Finally, the document concludes with a call to action for all financial managers and accountants. It encourages them to adopt a proactive approach to record-keeping, staying up-to-date on the latest developments and best practices in the field. By doing so, they can ensure the long-term success and sustainability of their organizations.

- (xii) Checks with wooden sluice gates should be placed in drains 2D-2, 2D-3 and 2D-4 to moisture the peat soil of the North Western part of the area.
- (xiii) Groundwater studies should be carried out in the South part of the area to find out the water yield of the Aquifer and the possibility of drilling wells with a high productivity in order to irrigate this part of the area.



REFERENCES

1. GRONTMIJ 1964 - Black River Morasses Reclamation Project.
GRONTMIJ. The Netherlands, 1964

APPENDIX I

**Average monthly rainfall, Estimated Effective Rainfall, and
Estimate of Probability of less than Average Rainfall Occur-
ing**

Month	Average monthly precipitation Santa Cruz 1931-1960		Effective Monthly Precipitation		Probability of less than average rain- fall
	Inches	MM	Inches	MM	
January	2.9	73.66	2.715	68.96	0.75-0.90
February	2.9	73.66	2.715	68.96	0.50-0.75
March	4.2	106.68	3.680	93.47	0.50-0.75
April	8.6	218.44	5.340	135.64	0.25-0.50
May	11.1	281.94	5.450	138.43	0.50-0.75
June	5.9	149.86	4.650	118.11	0.50-0.75
July	5.2	132.08	4.300	109.22	0.50-0.75
August	9.4	238.76	5.420	137.67	0.50-0.75
September	8.8	223.52	5.370	136.40	0.50-0.75
October	12.7	322.58	5.450	138.43	0.25-0.50
November	6.9	175.26	5.015	127.38	0.50-0.75
December	2.9	73.66	2.715	68.96	0.50-0.75

APPENDIX II

Effective Rainfall and Probability
of Actual rainfall equal to effective rainfall
by crops

RED PEAS (December - February) Class II d (m) and Class II d (o)

Month	EVP inches	K.C.	Actual Rainfall =EVA	EVA inches	Effective Rainfall inches	Deficit inches		mm	Frequency of actual rainfall = EVA
January	5.9439	1.04	10.00	6.1920	2.715	3.477	6.95	177	<0.1
February	6.5698	0.77	7.00	5.0587	2.715	2.347	4.69	119	<0.1
March	6.2267				3.690				
April	7.1028				5.340				
May	7.2368				5.450				
June	8.0015				4.650				
July	7.9712				4.300				
August	7.1001				5.420				
September	7.5002				5.370				
October	7.6906				5.470				
November	6.5283				5.015				
December	5.5283	0.48	2.78	2.6536	2.715				0.25-.50

COW PEAS (Class II d (m) and Class II d (o)

Month	EVP inches	K.C.	Actual Rainfall =EVA	EVA inches	Effective Rainfall inches	Deficit inches		mm	Frequency of actual rainfall = EVA
January	5.9539	1.04	10.00	6.1920	2.715	3.477	6.95	177	<0.1
February	6.5698	0.77	7.00	5.0587	2.715	2.343	4.69	119	<0.1
March	6.2267				3.680				
April	7.1028				5.340				
May	7.2368				5.450				
June	8.0015				4.650				
July	7.9712				4.300				
August	7.1001				5.420				
September	7.5002				5.370				
October	7.6906				5.450				
November	6.5249	0.48	3.44	3.1319	5.015				.50-0.75
December	5.5283	0.93	7.46	5.1413	2.715	2.426	4.852	123	<0.1

Serial No.	Name	Designation	Grade	Age	Sex	Religion	Marital Status	Address	Notes
1	J. K. Smith	Director	ASST. COM. 2	45	M	C	Married	100 Main St.	
2	M. L. Johnson	Asst. Dir.	ASST. COM. 1	42	M	C	Married	150 Elm St.	
3	R. H. Brown	Asst. Dir.	ASST. COM. 1	40	M	C	Married	200 Oak St.	
4	E. A. Davis	Asst. Dir.	ASST. COM. 1	38	M	C	Married	250 Pine St.	
5	G. W. Miller	Asst. Dir.	ASST. COM. 1	36	M	C	Married	300 Maple St.	
6	F. D. Wilson	Asst. Dir.	ASST. COM. 1	34	M	C	Married	350 Birch St.	
7	H. K. Taylor	Asst. Dir.	ASST. COM. 1	32	M	C	Married	400 Cedar St.	
8	J. R. Moore	Asst. Dir.	ASST. COM. 1	30	M	C	Married	450 Spruce St.	
9	K. L. Jackson	Asst. Dir.	ASST. COM. 1	28	M	C	Married	500 Willow St.	
10	L. M. White	Asst. Dir.	ASST. COM. 1	26	M	C	Married	550 Ash St.	
11	M. N. Black	Asst. Dir.	ASST. COM. 1	24	M	C	Married	600 Hickory St.	
12	N. O. Green	Asst. Dir.	ASST. COM. 1	22	M	C	Married	650 Walnut St.	
13	P. Q. Red	Asst. Dir.	ASST. COM. 1	20	M	C	Married	700 Cherry St.	
14	R. S. Blue	Asst. Dir.	ASST. COM. 1	18	M	C	Married	750 Peach St.	
15	S. T. Yellow	Asst. Dir.	ASST. COM. 1	16	M	C	Married	800 Plum St.	
16	T. U. Purple	Asst. Dir.	ASST. COM. 1	14	M	C	Married	850 Olive St.	
17	V. W. Grey	Asst. Dir.	ASST. COM. 1	12	M	C	Married	900 St. Louis St.	
18	X. Y. Orange	Asst. Dir.	ASST. COM. 1	10	M	C	Married	950 Madison St.	
19	Y. Z. Pink	Asst. Dir.	ASST. COM. 1	8	M	C	Married	1000 Monroe St.	
20	Z. A. Brown	Asst. Dir.	ASST. COM. 1	6	M	C	Married	1050 Taylor St.	

STATE OF MISSISSIPPI - DEPARTMENT OF AGRICULTURE

Serial No.	Name	Designation	Grade	Age	Sex	Religion	Marital Status	Address	Notes
21	J. B. King	Asst. Dir.	ASST. COM. 1	20	M	C	Married	1100 Washington St.	
22	K. C. Lee	Asst. Dir.	ASST. COM. 1	18	M	C	Married	1150 Franklin St.	
23	L. D. Walker	Asst. Dir.	ASST. COM. 1	16	M	C	Married	1200 Jefferson St.	
24	M. E. Hall	Asst. Dir.	ASST. COM. 1	14	M	C	Married	1250 Adams St.	
25	N. F. Young	Asst. Dir.	ASST. COM. 1	12	M	C	Married	1300 Baker St.	
26	O. G. Nelson	Asst. Dir.	ASST. COM. 1	10	M	C	Married	1350 Green St.	
27	P. H. Carter	Asst. Dir.	ASST. COM. 1	8	M	C	Married	1400 Hill St.	
28	Q. I. Evans	Asst. Dir.	ASST. COM. 1	6	M	C	Married	1450 Lincoln St.	
29	R. J. Roberts	Asst. Dir.	ASST. COM. 1	4	M	C	Married	1500 Madison St.	
30	S. K. Walker	Asst. Dir.	ASST. COM. 1	2	M	C	Married	1550 Taylor St.	
31	T. L. Hall	Asst. Dir.	ASST. COM. 1	1	M	C	Married	1600 Adams St.	
32	U. M. Young	Asst. Dir.	ASST. COM. 1	0	M	C	Married	1650 Baker St.	

RED PEAS (November - January) Class II d (m) and Class II d (o)

Month	EVP inches	K.C.	Actual Rainfall =EVA	EVA inches	Effective Rainfall inches	Deficit inches			Frequency actual rainfall = EVA
January	5.9539	0.77	5.77	4.5845	2.715	1.8695	3.739	95	<0.1
February	6.5698				2.715				
March	6.2267				3.680				
April	7.1028				5.340				
May	7.2368				5.450				
June	8.0015				4.650				
July	7.9712				4.300				
August	7.1001				5.420				
September	7.5002				5.370				
October	7.6906				5.450				
November	6.5249	0.48	3.44	3.1320	5.015				0.50-0.7:
December	5.5283	1.04	10.00	5.7494	2.715	3.03	6.07	154	<0.1

ACTUAL CROP EVAPOTRANSPIRATION (overall efficiency 0.5) Tomato (Class II d (o))

Month	EVP inches	K.C.	Actual Rainfall =EVA	EVA inches	Effective Rainfall inches	Frequency of rainfall =EVA	Deficit inches		mm
January	5.9539				2.715				
February	6.5698				2.715				
March	6.2267				3.680				
April	7.1028	0.40	3.054	2.84	5.34	.75.9			
May	7.2368	0.65	6.000	4.70	5.45	.75.9			
June	8.0015	0.65	10.00	7.68	4.65	.10.25	3.03	6.06	154
July	7.9712				4.30				
August	7.1001				5.42				
September	7.5002	0.40	3.27	3.00	5.37	.90.1.00			
October	7.6906	0.65	6.86	5.00	5.45	0.75.0.90			
November	6.5249	0.96	10.00	6.26	5.015	0.1 0.25	1.245	2.49	65
December	5.5283				2.715				

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Lettuce (Class II d (o))

Month	EVP inches	K.C.	Actual Rainfall =EVA	EVA inches	Effective Rainfall inches	Deficit inches	mm	Frequency of actual rainfall = EVA
January	5.9539				2.715			
February	6.5698				2.715			
March	6.2267				3.680			
April	7.1028				5.340			
May	7.2368				5.450			
June	8.0015				4.650			
July	7.9712				4.300			
August	7.1001				5.420			
September	7.5002	0.62	5.90	4.65	5.370			.75-0.90
October	7.6906	0.81	10.00	6.23	5.45			.50-0.75
November	6.5249	0.95	10.00	6.20	5.015,1.19	2.38	60	.10-0.25
December	5.5283				2.715			

Beans (Class II d (o))

Month	EVP inches	K.C.	Actual Rainfall =EVA	EVA inches	Effective Rainfall inches	Deficit inches	mm	Frequency of actual rainfall = EVA
January	5.9539	0.93	10.00	5.5371	2.715	2.8221	143	<0.1
February	6.5698				2.715			
March	6.2267				3.680			
April	7.1028				5.340			
May	7.2368				5.450			
June	8.0015				4.650			
July	7.9712				4.300			
August	7.1001				5.420			
September	7.5002				5.370			
November	7.6906	0.5	3.61	3.2625	5.015			
December	5.5283	0.8	5.44	4.4226	2.715,1.7076	3.4152	87	0.1-0.25

When EVA is greater than 5.45 inches the maximum useful average rainfall is 10 inches per month. For that month irrigation is required.

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Corn Class II d (m) and Class II d (o)

Month	EVP inches	K.C.	Actual Rainfall = EVA	EVA inches	Effective Rainfall inches		Deficit inches	mm	Frequenc of actua rainfall = EVA
January	5.9539				2.715				
Februray	6.5698				2.715				
March	6.2267	0.36	2.34	2.24	3.680				0.50-0.7
April	7.1028	0.67	6.17	4.76	5.340				0.50-0.7
May	7.2368	0.86	10.00	6.22	5.450				0.25-0.5
June	8.0015	0.65	7.75	5.20	4.650	0.55	1.10	28	0.10-0.2
July	7.9712				4.300				
August	7.1001	0.36	2.72	2.56	5.420				0.75-0.9
September	7.5002	0.67	6.94	5.03	5.370				0.50-0.7
October	7.6906	0.86	10.00	6.61	5.450				0.50-0.7
November	6.5249	0.65	5.08	4.24	5.015				0.50-0.7
Decemeber	5.5283				2.715				

Watermelon (Class II d (o))

Month	EVP inches	K.C.	Actual Rainfall = EVA	EVA inches	Effective Rainfall inches		Deficit inches	mm	Frequenc of actua rainfall = EVA
January	5.9539				2.715				
February	6.5698				2.715				
March	6.2267				3.680				
April	7.1028	.52	4.21	3.69	5.340				0.75-0.90
May	7.2368	.73	8.20	5.28	5.450				0.50-0.75
June	8.0015	.67	8.53	5.36	4.650	0.71	1.42	36	0.10-0.35
July	7.9712				4.300				
August	7.1001				5.420				
September	7.5002	0.52	4.53	3.90	5.370				0.75-0.9
October	7.6906	0.73	10.00	5.61	5.450				0.50-0.75
November	6.5249	0.67	5.34	4.37	5.015				0.25-0.50
December	5.5283				2.715				

When EVA is greater than 5.45 inches the maximum useful average rainfall is 10 inches per month. For that month irrigation is required.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice.

2. The second part details the various methods used for data collection and analysis. It includes a table summarizing the different techniques employed.

Method	Frequency	Accuracy	Cost
Surveys	Quarterly	High	Medium
Interviews	Monthly	Very High	High
Focus Groups	Bi-annually	Medium	Low
Online Analytics	Real-time	Medium	Low

3. The final section concludes with recommendations for future research and implementation. It suggests that further studies should focus on integrating advanced technologies like AI and machine learning to enhance data processing capabilities.

4. The following table provides a detailed breakdown of the data sources and their respective contributions to the overall findings.

Source	Volume	Reliability	Impact
Primary Data	150,000	95%	High
Secondary Data	80,000	80%	Medium
Public Records	30,000	70%	Low
Expert Opinions	10,000	90%	High

5. In conclusion, the study has successfully identified key trends and challenges in the current market environment. It is recommended that stakeholders take immediate action based on these findings to optimize their operations and improve customer satisfaction.

Banana

Month	EVA inches	K.C.	Actual Rainfall = EVA	EVA inches	Effective Rainfall inches		Deficit inches	mm	Frequer of actu rainfall = EVA
January	5.9539	0.95	10.00	5.66	2.715	2.95	5.9	150	.1
February	6.5698	0.95	10.00	6.24	2.715	3.53	7.06	179	.1
March	6.2267	0.95	10.00	5.92	3.680	2.24	4.48	114	.1
April	7.1028	0.95	10.00	6.75	5.340	1.41	2.82	73	0.25-0.
May	7.2368	0.95	10.00	6.88	5.450	-	-	-	
June	8.0015	0.95	10.00	7.60	4.650	2.95	5.9	150	0.10-0.
July	7.9712	0.95	10.00	7.57	4.300	3.27	6.54	166	.
August	7.1001	0.95	10.00	6.75	5.420	1.33	2.66	68	0.25-.5
September	7.5002	0.95	10.00	7.13	5.370	1.76	3.52	89	0.25-0.
October	7.6906	0.95	10.00	7.31	5.450	-	-	-	0.50-0.
November	6.5249	0.95	10.00	6.20	5.015	1.18	2.36	60	0.10-0.
December	5.5283	0.95	8.00	5.25	2.715	2.53	5.06	129	0

Irish Potato (Class II d (m)

Month	EVA inches	K.C.	Actual Rainfall = EVA	EVA inches	Effective Rainfall inches		Deficit inches	mm	Frequer of actu rainfall = EVA
January	5.9539				2.715				
February	6.5698				2.715				
March	6.2267	0.38	2.56	2.37	3.680				0.50-0.
April	7.1028	0.82	10.00	5.82	5.340	0.48	0.96	24	0.10-0.
May	7.2368	1.00	10.00	7.24	5.440				0.25-0.
June	8.0015	0.85	10.00	6.80	4.650	2.15	4.30	109	0.10-0.
July	7.9712				4.300				
August	7.1001				5.420				
September	7.5002	0.38	3.07	2.85	5.370				0.9-1.0
October	7.6906	0.82	10.00	6.31	5.450				0.50-0.7
November	6.5249	1.00	10.00	6.52	5.015	1.5	3.0	76	0.10-0.2
December	5.5283	0.85	6.00	4.70	2.715	1.98	3.96	101	0.10-0.2

When EVA is greater than 5.45 inches the maximum useful average rainfall is 10 inches per month. For that month irrigation is required

Onion Green (Class II d (o))

Month	EVP inches	K.C.	Actual Rainfall = EVA	EVA inches	Effective Rainfall inches	Deficit inches	Frequency of actual rainfall =EVA
January	5.9539				2.715		
February	6.5698				2.715		
March	6.2267				3.680		
April	7.1028	0.30	2.21	2.13	5.340		0.75-0.90
May	7.2368	0.73	8.20	5.28	5.450		0.50-0.75
June	8.0015				4.650		
July	7.9712				4.300		
August	7.1001				5.420		
September	7.5002	0.30	2.35	2.25	5.370		0.90-1.
October	7.6906	0.73	10.00	5.61	5.450		0.50-0.75
November	6.5249				5.015		
December	5.5283						

Onion Bulb (Class II d (o)^D)

Month	EVA inches	K.C.	Actual Rainfall = EVA	EVA inches	Effective Rainfall inches	Deficit inches	mm	Frequency of actual rainfall =EVA
January	5.9539				2.715			
February	6.5698				2.715			
March	6.2267				3.680			
April	7.1028	0.30	2.21	2.13	5.340			0.75-0.9
May	7.2368	0.73	8.20	5.28	5.450			0.50-0.75
June	8.0015	0.20	1.63	1.60	4.650			0.75-0.90
July	7.9712				4.300			
August	7.1001				5.420			
September	7.5002	0.30	2.35	2.25	5.370			0.90-1.0
October	7.6906	0.73	10.00	5.61	5.450			0.50-0.75
November	6.5249	0.20	1.33	1.31	5.015			0.90-1.0
December	5.5283				2.715			

When EVA is greater than 4.45 inches the maximum useful average rainfall is 10 inches per month. For that month irrigation is required

Year	1987	1988	1989	1990	1991	1992
AV-1	1000	1000	1000	1000	1000	1000
AV-2	1000	1000	1000	1000	1000	1000
AV-3	1000	1000	1000	1000	1000	1000
AV-4	1000	1000	1000	1000	1000	1000
AV-5	1000	1000	1000	1000	1000	1000
AV-6	1000	1000	1000	1000	1000	1000
AV-7	1000	1000	1000	1000	1000	1000
AV-8	1000	1000	1000	1000	1000	1000
AV-9	1000	1000	1000	1000	1000	1000
AV-10	1000	1000	1000	1000	1000	1000

Year	1987	1988	1989	1990	1991	1992
AV-1	1000	1000	1000	1000	1000	1000
AV-2	1000	1000	1000	1000	1000	1000
AV-3	1000	1000	1000	1000	1000	1000
AV-4	1000	1000	1000	1000	1000	1000
AV-5	1000	1000	1000	1000	1000	1000
AV-6	1000	1000	1000	1000	1000	1000
AV-7	1000	1000	1000	1000	1000	1000
AV-8	1000	1000	1000	1000	1000	1000
AV-9	1000	1000	1000	1000	1000	1000
AV-10	1000	1000	1000	1000	1000	1000

See page 10 for more information regarding the data presented in this report.

Carrots (Class II d (m))

Months	EVP inches	K.C.	Actual Rainfall =EVA	EVA inches	Effective Rainfall inches	Deficit inches	mm	Frequency of actual rainfall = EVA
January	5.9539				2.715			
February	6.5698				2.715			
March	6.2267				3.680			
April	7.1028	0.51	4.11	3.62	5.340			0.75-0.90
May	7.2368	0.63	5.72	4.56	5.450			0.75-0.90
June	8.0015	0.27	2.25	2.16	4.650			0.75-0.90
July	7.9712				4.300			
August	7.1001				5.420			
September	7.5002	0.51	4.43	3.83	5.370			0.90-1.0
October	7.6906	0.63	6.43	4.85	5.450			0.90-1.0
November	6.5249	0.27	1.80	1.76	5.015			0.90-1.0
December	5.5283				2.715			

Cabbage (Class II d (o))

Months	EVP inches	K.C.	Actual Rainfall =EVA	EVA inches	Effective Rainfall inches	Deficit inches	mm	Frequency of actual rainfall = EVA
January	5.9539				2.715			
February	6.5698				2.715			
March	6.2267				3.680			
April	7.1028				5.340			
May	7.2368				5.450			
June	8.0015				4.650			
July	7.9712				4.300			
August	7.1001				5.420			
September	7.5002	0.48	4.08	3.60	5.370			0.9-1.0.
October	7.6906	0.73	10.00	5.61	5.450			0.5-0.75
November	6.5249	0.46	3.27	3.00	5.015			0.75-0.90
December	5.5283				2.715			

When EVA is greater than 5.45 inches, the maximum useful average rainfall is 10 inches per month. For that month irrigation is required.

Peanuts (Class II d (m))

Month	EVP inches	K.C.	Actual Rainfall = EVA	EVA inches	Effective Rainfall inches		Deficit inches	mm	Frequency of actual rainfall = EVA
January	5.9539				2.715				
February	6.5698				2.715				
March	6.2267	0.23	1.45	1.4321	3.680				0.75-0.90
April	7.1028	0.64	5.70	4.5458	5.340				0.50-0.75
May	7.2368	0.80	10.00	5.7894	5.450				0.25-0.50
June	8.0015	0.63	6.97	5.0409	4.650	0.39	0.78	20	0.25-0.50
July	7.9712				4.300				
August	7.1001				5.420				
September	7.5002				5.370				
October	7.6906				5.450				
November	6.5249				5.015				
December	5.5283				2.715				

Sweet Potatoes (Class II d (m))

Month	EVP inches	K.C.	Actual Rainfall = EVA	EVA inches	Effective Rainfall inches		Deficit inches	mm	Frequency of actual rainfall = EVA
January	5.9539				2.715				
February	6.5698				2.715				
March	6.2267	0.38	2.56	2.37	3.680				0.50-0.75
April	7.1028	0.82	10.00	5.82	5.340	0.48	0.96	24	0.25-0.50
May	7.2368	1.00	10.00	7.24	5.450				0.25-0.50
June	8.0015	0.85	10.00	6.80	4.650	2.15	2.30	109	0.10-0.25
July	7.9712				4.300				
August	7.1001				5.420				
September	7.5002	0.38	3.07	2.85	5.370				0.90-1.0
October	7.6906	0.82	10.00	6.31	5.450				0.5-0.75
November	6.5249	1.00	10.00	6.52	5.015	1.5	3.0	76	0.1-0.25
December	5.5283	0.85	6.00	4.70	2.715	1.98	3.96	101	0.1-0.25

When EVA is greater than 5.45 inches, the maximum useful average rainfall is 10 inches per month. For that month irrigation is required.

Year	Month	Day	Time	Location	Temperature	Humidity	Wind	Clouds	Remarks
1950	Jan	1	08:00	...	...	...	...	...	...
1950	Jan	2	08:00	...	...	...	...	...	...
1950	Jan	3	08:00	...	...	...	...	...	...
1950	Jan	4	08:00	...	...	...	...	...	...
1950	Jan	5	08:00	...	...	...	...	...	...
1950	Jan	6	08:00	...	...	...	...	...	...
1950	Jan	7	08:00	...	...	...	...	...	...
1950	Jan	8	08:00	...	...	...	...	...	...
1950	Jan	9	08:00	...	...	...	...	...	...
1950	Jan	10	08:00	...	...	...	...	...	...
1950	Jan	11	08:00	...	...	...	...	...	...
1950	Jan	12	08:00	...	...	...	...	...	...
1950	Jan	13	08:00	...	...	...	...	...	...
1950	Jan	14	08:00	...	...	...	...	...	...
1950	Jan	15	08:00	...	...	...	...	...	...
1950	Jan	16	08:00	...	...	...	...	...	...
1950	Jan	17	08:00	...	...	...	...	...	...
1950	Jan	18	08:00	...	...	...	...	...	...
1950	Jan	19	08:00	...	...	...	...	...	...
1950	Jan	20	08:00	...	...	...	...	...	...
1950	Jan	21	08:00	...	...	...	...	...	...
1950	Jan	22	08:00	...	...	...	...	...	...
1950	Jan	23	08:00	...	...	...	...	...	...
1950	Jan	24	08:00	...	...	...	...	...	...
1950	Jan	25	08:00	...	...	...	...	...	...
1950	Jan	26	08:00	...	...	...	...	...	...
1950	Jan	27	08:00	...	...	...	...	...	...
1950	Jan	28	08:00	...	...	...	...	...	...
1950	Jan	29	08:00	...	...	...	...	...	...
1950	Jan	30	08:00	...	...	...	...	...	...
1950	Jan	31	08:00	...	...	...	...	...	...

Year	Month	Day	Time	Location	Temperature	Humidity	Wind	Clouds	Remarks
1950	Jan	1	16:00	...	...	...	...	...	...
1950	Jan	2	16:00	...	...	...	...	...	...
1950	Jan	3	16:00	...	...	...	...	...	...
1950	Jan	4	16:00	...	...	...	...	...	...
1950	Jan	5	16:00	...	...	...	...	...	...
1950	Jan	6	16:00	...	...	...	...	...	...
1950	Jan	7	16:00	...	...	...	...	...	...
1950	Jan	8	16:00	...	...	...	...	...	...
1950	Jan	9	16:00	...	...	...	...	...	...
1950	Jan	10	16:00	...	...	...	...	...	...
1950	Jan	11	16:00	...	...	...	...	...	...
1950	Jan	12	16:00	...	...	...	...	...	...
1950	Jan	13	16:00	...	...	...	...	...	...
1950	Jan	14	16:00	...	...	...	...	...	...
1950	Jan	15	16:00	...	...	...	...	...	...
1950	Jan	16	16:00	...	...	...	...	...	...
1950	Jan	17	16:00	...	...	...	...	...	...
1950	Jan	18	16:00	...	...	...	...	...	...
1950	Jan	19	16:00	...	...	...	...	...	...
1950	Jan	20	16:00	...	...	...	...	...	...
1950	Jan	21	16:00	...	...	...	...	...	...
1950	Jan	22	16:00	...	...	...	...	...	...
1950	Jan	23	16:00	...	...	...	...	...	...
1950	Jan	24	16:00	...	...	...	...	...	...
1950	Jan	25	16:00	...	...	...	...	...	...
1950	Jan	26	16:00	...	...	...	...	...	...
1950	Jan	27	16:00	...	...	...	...	...	...
1950	Jan	28	16:00	...	...	...	...	...	...
1950	Jan	29	16:00	...	...	...	...	...	...
1950	Jan	30	16:00	...	...	...	...	...	...
1950	Jan	31	16:00	...	...	...	...	...	...

... ..

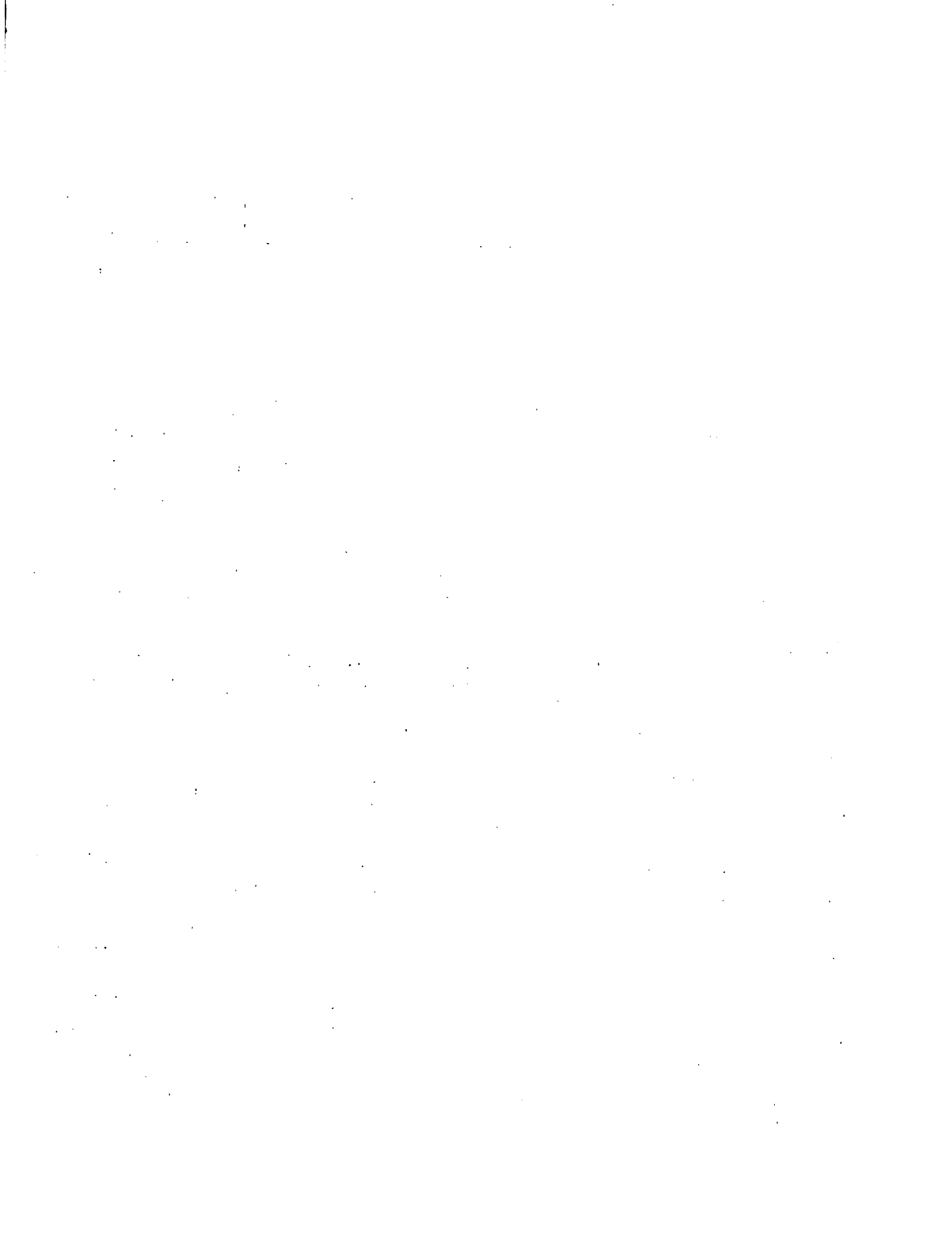
Peas (Class II d (m) and (Class II d (o))

Month	EVP inches	K.C.	Actual Rainfall =EVA	EVA inches	Effective Rainfall inches		Deficit inches	mm	Frequency of actual rainfall = EVA
January	5.9539	0.27	1.64	1.6067	2.715				.25-0.50
February	6.5689	0.42	2.95	2.7593	2.715	0.04	0.08	2.25	.25-0.50
March	6.2267	0.58	4.09	3.6115	3.690	-	-	-	.25-0.50
April	7.1028	0.70	6.83	4.9720	5.340	-	-	-	.50-0.75
May	7.2368	0.78	10.00	5.6447	5.450	-	-	-	.25-0.50
June	8.0015	0.81	10.00	6.4812	4.650	1.83	3.66	93.00	.10-0.25
July	7.9712	0.77	10.00	6.1378	4.300	1.8378	3.6756	93.00	0.10
August	7.1001	0.71	6.97	5.0411	5.420	-	-	-	.50-.75
September	7.5002	0.63	6.6	4.7251	5.370	-	-	-	.90-1.0
October	7.6906	0.54	4.92	4.1529	5.450				.90-1.0
November	6.5249	0.43	3.00	2.8057	5.015				.75-0.9
December	5.5283	0.30	1.69	1.6585	2.715				.50-0.75

Sorghum (Class II d (m))

Month	EVP inches	K.C.	Actual Rainfall =EVA	EVA inches	Effective Rainfall inches	Deficit inches	mm	Frequency of actual rainfall = EVA
January	5.9539				2.715			
February	6.5698				2.715			
March	6.2267	0.36	2.24	2.24	3.680			0.5-1.75
April	7.1028	0.67	6.17	4.76	5.340			0.5-0.75
May	7.2368	0.86	10.00	6.22	5.450			0.25-0.5
June	8.0015	0.65	7.75	5.20	4.650	0.55	1.1	28.0.1-0.25
July	7.9712				4.300			
August	7.1001	0.36	2.72	2.56	5.420			0.75-0.90
September	7.5002	0.67	6.94	5.03	5.370			0.5-0.75
October	7.6906	0.86	10.00	6.61	5.450			0.5-0.75
November	6.5249	0.65	5.08	4.24	5.015			0.5-0.75
December	5.5283				2.715			

When EVA is greater than 5.45 inches, the maximum useful average rainfall is 10 inches per month. For that month irrigation is required.



Sugar Cane (Class II d (m))

Month	EVP inches	K.C.	Actual Rainfall = EVA	EVA inches	Effective Rainfall inches	Deficit inches	mm	Frequency of actual rain- fall = EVA
January	5.9539	0.91	9.40	5.418	2.715 2.7030	5.4060	137	0.1
February	6.5698	0.84	10.00	5.5186	2.715 2.8036	5.6072	142	0.1
March	6.2267	0.80	6.80	4.9814	3.680 1.3014	2.6028	66	0.1-0.25
April	7.1028	0.79	10.00	6.3128	5.340 0.9728	1.9456	49	0.24-0.5
May	7.2368	0.81	10.00	5.8618	5.450 -	-	-	0.25-0.5
June	8.0015	0.85	10.00	6.8013	4.650 2.1513	4.3026	100	0.1-0.25
July	7.9712	0.92	10.00	7.335	4.650 3.0335	6.0670	154	0.1
August	7.1001	0.99	10.00	6.1101	5.420 0.6901	1.3802	35	0.25-0.5
September	7.5002	1.03	10.00	7.7252	5.370 2.3553	4.7104	120	0.25-0.5
October	7.6906	1.05	10.00	8.0751	5.450 -	-	-	0.5-0.75
November	6.5249	1.03	10.00	6.7206	5.015 1.7056	3.4112	87	0.1-0.25
December	5.5283	0.99	10.00	5.4730	2.715 2.7580	5.5160	140	<0.1

Rice (Class II d (m) and Class II d (o) **

Month	EVP inches	K.C.	Actual Rainfall =EVA	EVA inches	Effective Rainfall inches	Deficit inches	mm	Frequency of actual rainfall =EVA
January	5.9539				2.715			
February	6.5689				2.715			
March	6.2267	0.63	4.60	3.9228	3.680 0.24+2=2.24	4.48	114	0.25-0.5
April	7.1028	0.91	10.00	6.4635	5.340 1.12+2=3.12	6.24	158	0.1-0.25
May	7.2368	0.91	10.00	6.5855	5.450 0.79+2=2.79	5.58	142	0.1-0.25
June	8.0015	0.68	9.80	5.4410	4.650 0.79+2=2.79	5.58	142	0.1-0.25
July	7.9712				4.300			
August	7.1001				5.420			
September	7.5002	0.63	6.6	4.7251	5.370			0.75-0.90
October	7.6906	0.91	10.00	6.9984	5.450			0.50-0.75
November	6.5249	0.91	10.00	5.9377	5.015 0.72+2=2.72	5.44	138	0.1-0.25
December	5.5282	0.68	4.32	3.7592	2.715 1.04+2=3.04	6.08	154	0.1-0.25

** For rice a layer of 2 inches has been used.

Year	Month	Day	Time	Location	Activity	Notes
1950	1	1	08:00	...	...	...
1950	1	2	08:00	...	...	...
1950	1	3	08:00	...	...	...
1950	1	4	08:00	...	...	...
1950	1	5	08:00	...	...	...
1950	1	6	08:00	...	...	...
1950	1	7	08:00	...	...	...
1950	1	8	08:00	...	...	...
1950	1	9	08:00	...	...	...
1950	1	10	08:00	...	...	...
1950	1	11	08:00	...	...	...
1950	1	12	08:00	...	...	...
1950	1	13	08:00	...	...	...
1950	1	14	08:00	...	...	...
1950	1	15	08:00	...	...	...
1950	1	16	08:00	...	...	...
1950	1	17	08:00	...	...	...
1950	1	18	08:00	...	...	...
1950	1	19	08:00	...	...	...
1950	1	20	08:00	...	...	...
1950	1	21	08:00	...	...	...
1950	1	22	08:00	...	...	...
1950	1	23	08:00	...	...	...
1950	1	24	08:00	...	...	...
1950	1	25	08:00	...	...	...
1950	1	26	08:00	...	...	...
1950	1	27	08:00	...	...	...
1950	1	28	08:00	...	...	...
1950	1	29	08:00	...	...	...
1950	1	30	08:00	...	...	...
1950	1	31	08:00	...	...	...

Year	Month	Day	Time	Location	Activity	Notes
1950	2	1	08:00	...	...	...
1950	2	2	08:00	...	...	...
1950	2	3	08:00	...	...	...
1950	2	4	08:00	...	...	...
1950	2	5	08:00	...	...	...
1950	2	6	08:00	...	...	...
1950	2	7	08:00	...	...	...
1950	2	8	08:00	...	...	...
1950	2	9	08:00	...	...	...
1950	2	10	08:00	...	...	...
1950	2	11	08:00	...	...	...
1950	2	12	08:00	...	...	...
1950	2	13	08:00	...	...	...
1950	2	14	08:00	...	...	...
1950	2	15	08:00	...	...	...
1950	2	16	08:00	...	...	...
1950	2	17	08:00	...	...	...
1950	2	18	08:00	...	...	...
1950	2	19	08:00	...	...	...
1950	2	20	08:00	...	...	...
1950	2	21	08:00	...	...	...
1950	2	22	08:00	...	...	...
1950	2	23	08:00	...	...	...
1950	2	24	08:00	...	...	...
1950	2	25	08:00	...	...	...
1950	2	26	08:00	...	...	...
1950	2	27	08:00	...	...	...
1950	2	28	08:00	...	...	...
1950	2	29	08:00
1950	2	30	08:00

For more information, please contact the office.

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- 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 Christiansa", May 1978

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<u>First Annual Report, The Agricultural Information System in Jamaica, Department of Agriculture, Jamaica, 1973</u>	No. 1 - 1
<u>Young People's Agricultural Program in Jamaica, June 1973</u>	No. 1 - 2
<u>Aston S. Wood, Ph.D., Agricultural Education in Jamaica, December - October 1973</u>	No. 1 - 3
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The following table shows the results of the survey conducted in the year 1950. The data is presented in a tabular format, with columns representing different categories and rows representing individual data points. The table is organized into several sections, each corresponding to a different aspect of the survey. The first section, labeled 'Section A', contains data on the general population. The second section, labeled 'Section B', contains data on the economic conditions. The third section, labeled 'Section C', contains data on the social conditions. The fourth section, labeled 'Section D', contains data on the cultural conditions. The fifth section, labeled 'Section E', contains data on the political conditions. The sixth section, labeled 'Section F', contains data on the environmental conditions. The seventh section, labeled 'Section G', contains data on the health conditions. The eighth section, labeled 'Section H', contains data on the education conditions. The ninth section, labeled 'Section I', contains data on the housing conditions. The tenth section, labeled 'Section J', contains data on the transportation conditions. The eleventh section, labeled 'Section K', contains data on the communication conditions. The twelfth section, labeled 'Section L', contains data on the recreation conditions. The thirteenth section, labeled 'Section M', contains data on the security conditions. The fourteenth section, labeled 'Section N', contains data on the infrastructure conditions. The fifteenth section, labeled 'Section O', contains data on the public services conditions. The sixteenth section, labeled 'Section P', contains data on the urban planning conditions. The seventeenth section, labeled 'Section Q', contains data on the environmental protection conditions. The eighteenth section, labeled 'Section R', contains data on the social justice conditions. The nineteenth section, labeled 'Section S', contains data on the human rights conditions. The twentieth section, labeled 'Section T', contains data on the international relations conditions. The twenty-first section, labeled 'Section U', contains data on the global issues conditions. The twenty-second section, labeled 'Section V', contains data on the future prospects conditions. The twenty-third section, labeled 'Section W', contains data on the challenges and opportunities conditions. The twenty-fourth section, labeled 'Section X', contains data on the policy recommendations conditions. The twenty-fifth section, labeled 'Section Y', contains data on the implementation of the policy recommendations conditions. The twenty-sixth section, labeled 'Section Z', contains data on the monitoring and evaluation of the implementation of the policy recommendations conditions.

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