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NURTURING RESILIENCE: COMPREHENSIVE DROUGHT ASSESSMENT STRATEGIES TO SAFEGUARD CASSAVA PRODUCTION FROM CLIMATE IMPACT

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ABSTRACT

This research delves into the intricate dynamics of drought impact on cassava production, aiming to cultivate resilience strategies against climate fluctuations. Focusing on comprehensive drought assessment, the study navigates through the vulnerabilities and adaptations crucial for safeguarding cassava cultivation. Through a multidimensional analysis, encompassing agronomic, climatic, and socio-economic factors, the research aims to provide insights and solutions for mitigating climate impacts on cassava production. The findings contribute to the development of resilient agricultural practices, essential for securing food systems in the face of an increasingly unpredictable climate.

KEYWORDS

Cassava, Drought Assessment, Climate Impact, Resilience Strategies, Agricultural Adaptation, Food Security, Climate Fluctuations, Agronomic Factors, Socio-economic Resilience, Sustainable Agriculture.

INTRODUCTION

In the realm of global agriculture, cassava stands as a vital crop, providing sustenance for millions of people

worldwide. However, the escalating impacts of climate change, marked by unpredictable weather patterns

and increased frequency of drought events, pose imminent threats to the resilience of cassava production. Recognizing the urgency of this challenge, our study, titled "Nurturing Resilience: Comprehensive Drought Assessment Strategies to Safeguard Cassava Production from Climate Impact," embarks on a journey to unravel the complexities of drought's impact on cassava cultivation and to devise strategies that fortify its resilience in the face of climate adversity.

Cassava (*Manihot esculenta* Crantz) serves as a staple for numerous communities, particularly in regions where it thrives in diverse climates. The susceptibility of cassava to drought stress raises concerns about the sustainability of its production, potentially jeopardizing food security and livelihoods. This study is conceived as a response to this critical juncture, aiming to comprehensively assess the implications of drought on cassava cultivation and chart a course toward adaptive and resilient strategies.

Our investigation extends beyond traditional agronomic assessments, delving into the multidimensional aspects of climate impact on cassava. We will explore not only the physiological responses of cassava plants to drought but also the socio-economic dimensions, considering the implications for farmers and communities dependent on cassava cultivation.

As we embark on this journey, our objectives include mapping the vulnerability of cassava to drought, identifying key adaptive strategies employed by farmers, and proposing resilient agricultural practices to mitigate the impact of climate change. By nurturing resilience in cassava production, we aspire to contribute not only to the preservation of a vital food source but also to the broader discourse on sustainable agriculture in the face of an ever-changing climate landscape.

Throughout the subsequent sections, we will navigate through the intricacies of drought assessment for cassava, seeking to uncover insights that go beyond immediate challenges, with the ultimate goal of fostering a resilient and sustainable future for cassava cultivation amid the uncertainties posed by climate change.

METHOD

The research journey towards nurturing resilience in cassava production amid climate change involved a systematic and comprehensive process. Commencing with the careful selection of study sites representative of diverse agroecological conditions, the research aimed to capture the nuances of cassava cultivation in varying climates and soils.

Agronomic assessments formed a cornerstone of the process, combining field surveys and experimental plots to scrutinize the physiological responses of cassava to drought stress. These assessments not only quantified yield metrics and growth stages but also delved into the intricacies of cassava varieties and their respective tolerance levels, contributing essential insights for resilience strategies.

Simultaneously, a thorough climatic analysis unfolded, incorporating the collection of meteorological data and climate modeling techniques. This dual approach allowed the research team to correlate observed impacts on cassava with climatic variables while projecting future climate scenarios. Understanding the evolving patterns of drought frequency and intensity provided a crucial backdrop for crafting adaptive measures.

The socio-economic dimensions of cassava cultivation were explored through stakeholder interviews, surveys, and questionnaires. Engaging with farmers,

agricultural extension officers, and local communities, this phase of the research aimed to unravel the economic importance of cassava, the existing adaptive strategies employed by farmers, and the challenges faced at the community level.

The subsequent phase involved the meticulous integration and analysis of agronomic, climatic, and socio-economic data. Statistical analyses were employed to uncover correlations and patterns, allowing for a holistic understanding of the multifaceted challenges posed by drought on cassava production. This synthesis formed the basis for the formulation of resilience strategies, encompassing agronomic practices, water management techniques, and socio-economic interventions.

The culmination of this research process aimed not only to dissect the immediate impacts of drought on cassava but also to provide practical, context-specific strategies to fortify cassava cultivation against the uncertainties of climate change. By nurturing resilience in cassava production, the research aspired to contribute not only to the sustainability of this vital crop but also to the broader discourse on adaptive agriculture in the face of an evolving climate landscape.

To unravel the complexities of drought impact on cassava production and develop comprehensive resilience strategies, a multifaceted research methodology was employed. The approach integrated agronomic, climatic, and socio-economic perspectives, aiming to provide a holistic understanding of the challenges and opportunities associated with safeguarding cassava cultivation from climate impact.

Selection of Study Sites:

The research began with the careful selection of study sites in regions where cassava is a crucial component of agricultural systems. Sites were chosen to represent diverse agroecological conditions, considering variations in climate, soil types, and farming practices. This ensured a comprehensive understanding of the different contexts in which cassava is cultivated.

Agronomic Assessments:

a. Field Surveys:

Field surveys were conducted to collect agronomic data, including cassava growth stages, yield metrics, and physiological responses to drought stress. The surveys also aimed to identify specific cassava varieties prevalent in the selected regions and their respective drought tolerance levels.

b. Experimental Plots:

Experimental plots were established to simulate drought conditions and assess the response of cassava plants under controlled environments. Physiological parameters, such as water-use efficiency and photosynthetic rates, were measured to gauge the impact of drought on plant performance.

Climatic Analysis:

a. Meteorological Data Collection:

Meteorological data, including precipitation patterns, temperature fluctuations, and humidity levels, were collected from local weather stations. This data was crucial for correlating climatic variables with observed impacts on cassava cultivation.

b. Climate Modeling:

Climate modeling techniques were employed to project future climate scenarios in the study regions.

This facilitated an assessment of the potential changes in drought frequency and intensity, providing insights into the long-term challenges faced by cassava cultivation.

Socio-economic Assessments:

a. Stakeholder Interviews:

In-depth interviews were conducted with cassava farmers, agricultural extension officers, and local community members. These interviews aimed to understand the socio-economic dimensions of cassava cultivation, including the economic importance of cassava, existing adaptive strategies, and challenges faced by farmers.

b. Surveys and Questionnaires:

Surveys and questionnaires were distributed to collect quantitative socio-economic data. This included information on income generated from cassava cultivation, access to resources, and the level of awareness among farmers regarding climate change impacts.

Data Integration and Analysis:

A comprehensive synthesis of agronomic, climatic, and socio-economic data was conducted. Statistical analyses were employed to identify correlations between climate variables, agronomic parameters, and socio-economic factors. This integrative approach aimed to uncover nuanced relationships and inform the development of targeted resilience strategies.

Resilience Strategy Formulation:

Based on the findings from the integrated analysis, resilience strategies were formulated. These strategies encompassed agronomic practices, water management techniques, and socio-economic

interventions designed to enhance the adaptive capacity of cassava cultivation in the face of climate impact.

The combination of these methodological approaches aimed to provide a thorough understanding of the multifaceted challenges posed by drought on cassava production and offer practical strategies to nurture resilience in the cultivation of this vital crop.

RESULTS

The comprehensive research on nurturing resilience in cassava production amidst climate change revealed multifaceted insights. Agronomic assessments showcased varying drought responses among cassava varieties, with some demonstrating higher tolerance levels and better physiological adaptability. Yield metrics and growth stages provided a nuanced understanding of the impact of drought stress on cassava production.

Climatic analysis uncovered a concerning trend of increasing drought frequency and intensity in the study regions. Projections from climate modeling highlighted the potential exacerbation of these conditions in the future. The correlation between meteorological variables and observed impacts on cassava underscored the need for adaptive strategies to mitigate the evolving challenges posed by climate change.

Socio-economic assessments illuminated the economic importance of cassava, with farmers employing diverse adaptive strategies such as altering planting calendars and diversifying income sources. However, challenges related to access to resources and awareness of climate change impacts were evident, emphasizing the need for targeted interventions to enhance resilience at the community level.

DISCUSSION

The discussion delves into the interconnectedness of agronomic, climatic, and socio-economic factors influencing cassava resilience. It explores the potential synergies between adaptive strategies, such as selecting drought-tolerant varieties and implementing sustainable water management practices. The discussion also addresses the importance of community-based initiatives, highlighting the role of education and awareness in fostering resilience among cassava farmers.

Considerations for the economic implications of resilience strategies are woven into the dialogue, emphasizing the need for interventions that not only safeguard cassava production but also enhance the livelihoods of those dependent on it. The discussion navigates through the complexities of implementing adaptive measures in diverse agroecological contexts, recognizing the need for context-specific and participatory approaches.

CONCLUSION

In conclusion, the research on nurturing resilience in cassava production offers a holistic understanding of the challenges and opportunities associated with climate change impacts. The results underscore the importance of integrating adaptive strategies that consider agronomic, climatic, and socio-economic dimensions. The formulated resilience strategies, rooted in empirical evidence, aim to fortify cassava cultivation against the uncertainties of a changing climate.

This research contributes not only to the scientific understanding of climate impacts on cassava but also to practical interventions that can be implemented at both the farm and community levels. By nurturing

resilience, this study envisions a future where cassava production not only survives in the face of climate change but thrives, ensuring food security and economic stability for communities dependent on this vital crop.

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