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Precision agriculture in Ghana: Stakeholders’ awareness and pathways to sustainable development

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Abstract

Precision Agriculture (PA) has the potential to transform cocoa production in Ghana by improving efficiency, sustainability, and productivity. However, stakeholder awareness and knowledge gaps pose challenges to its adoption. This study investigates the awareness and knowledge levels of scientists, Cocoa Extension Agents (CEAs), and cocoa farmers regarding PA components and innovations.

A comparative assessment was conducted across three main components of PA—information systems, technological tools, and management practices—focusing on stakeholder groups (scientists, Cocoa Extension Agents (CEAs), and cocoa farmers) within Ghana’s cocoa industry. A census of scientists at the Cocoa Research Institute, a survey of 422 cocoa farmers and 141 Cocoa

Extension Agents (CEAs) were randomly selected from the three cocoa regions (Western North, Western South, and Eastern Cocoa Regions) in Ghana

Results indicate that scientists exhibited the highest awareness of PA innovations, followed by CEAs, while cocoa farmers demonstrated the lowest awareness, particularly of PA technologies (PATs). Both scientists and CEAs showed fair knowledge of information and technological tools but limited understanding of management and decision-support systems essential for effective PA implementation. An exception was the use of GPS receivers, where knowledge levels were relatively high.

To bridge these gaps, the study proposes:

Awareness creation initiatives led by the Cocoa Research Institute of Ghana (CRIG), in collaboration with the Cocoa Health and Extension Division (CHED) and private GIS operators, targeting farmers and CEAs.

Establishment of a dedicated PA research unit within CRIG to advance context-specific innovations through trials and stakeholder engagement.

Strengthening CEAs’ training programmes to emphasise foundational practices such as row planting and mechanisation, particularly for new farms and replanting initiatives.

Enhancing stakeholder knowledge and awareness of PA tools and practices is critical to fostering adoption, improving productivity, and ensuring sustainable agricultural development in Ghana’s cocoa industry.

Keywords: Agricultural innovation, cocoa industry, extension services,, Ghana, GIS, precision agriculture, stakeholder awareness, sustainable agriculture