Inventory Audit of Climate-Smart Agriculture Communication Materials From Texas A&M AgriLife

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Introduction

Climate-Smart Agriculture (CSA) was introduced by the Food and Agriculture Organization of the United Nations (FAO) in 2010 to enhance productivity, build resilience to climate change, and reducing greenhouse gas emissions. It has been proposed as a foundational approach for agricultural systems to address the challenges of climate change while ensuring food security (Zhao, Liu, & Huang, 2023). While research has identified practices aligning with CSA (Li et al., 2023), effective science communication and extension are essential for translating these discoveries into practical applications (Black, 2000). Globally, the integration of CSA into political and policy frameworks has been widely discussed (Lalande, 2024). However, research on communication beyond these environments and the adoption of these practices by farming communities remains slow (Li et al., 2023). Research highlights the effectiveness of in-person events (e.g., field walks) to disseminate scientific findings (Rogers, 2014), yet a multimedia approach is crucial to ensuring broader reach and adoption (Leach, 2018).

Despite progress, CSA communication still faces challenges (Lalande, 2024). While extensive literature exists on global CSA communication, there is a notable gap in research on its dissemination within the U.S., particularly through Land-Grant Universities and their extension services (Davila et al., 2024). One critical gap involves extension agents' access to CSA information to support their ability to share CSA information effectively. Addressing this issue is key to strengthening CSA communication strategies and promoting widespread adoption. This study examined the extent to which [state] county extension agents have access to education and extension materials to share CSA information with producers.

Conceptual Framework

This study draws from the Theory of Planned Behavior (TPB). An essential attribute of the TPB is the level of control, or behavioral control, that an individual perceives they have to carry out a specific action or behavior (Ajzen, 1991). This includes whether someone has the necessary resources or tools to perform a behavior. For county extension agents to effectively share information on CSA, it is critical to first determine whether such information and resources exist and to what extent. To explore this, a quantitative inventory audit of online communication materials was completed.

Methods

We conducted a content inventory, which establishes the extent of communication available and reveals patterns in content quantity and type. This approach provides a summary of communication assets, offering insight into possible strengths and weaknesses (Land, 2014). For this study, a content inventory will evaluate the extent of resources that could enhance county extension agents' ability to help farmers understand climate-smart practices and related foundational concepts. An inventory audit was conducted of online communication efforts related to CSA by Texas A&M AgriLife. Content was gathered from websites, online learning databases, news blogs, and social media platforms.

We developed a codebook to guide the inventory audit and describe the content found (i.e., communication channel, date posted, CSA practices, and agriculture sectors). Search terms were "Climate-Smart Agriculture," "Regenerative Agriculture," and "Sustainable." These terms have strong links to CSA practices (Ashutosh et al., 2024) and ensured that all possible materials were found. Definitions of CSA practices were guided by the *Climate-Smart Agriculture and Forestry (CSAF) Mitigation Activities List for FY 2025* (USDA, NRCS., 2023). Some of the CSA practices included were soil conservation, waste and water management, sustainable livestock systems and cropping systems, and natural resources and

forestry management. Agriculture sectors were guided by *USDA Agricultural Projections to 2032* (USDA, 2023) and condensed for ease of coding. Communication materials published before December 31, 2024, were included in the sample. Data was analyzed in SPSS to calculate frequencies and percentages.

Results

The inventory audit identified 234 communications and resource materials. The audit found that communication materials were first published in 1989 in the form of research publications. Major events such as the introduction of the internet and social media saw other material emerge in the form of extension publications, online courses, and social media content. Research publications spiked after 2010, with the announcement of CSA, moving from 2 publications per year to 6 publications per year on average. In 2020, online materials such as e-news, extension publications, and social media saw a slight increase. However, by 2024, research publications (n = 141, 61%) remained the most prevalent. Communication materials other than research publications were lower, collectively making up 39% of the inventory. Among these, extension publications accounted for 11% (n = 26), news articles, 9% (n = 21), and announcements, 7% (n = 17). Most communication materials addressed the agriculture industry (n = 114) and did not mention a specific sector. Cropping was the most prevalent sector mentioned, with 45 pieces of content found. Only 33% of the material found mentioned an action related to a CSA practice, with sustainable cropping systems (n = 19) (e.g., conservation, crop rotation, cover cropping, and strip cropping) having the most supporting material, followed by livestock management (n =15) (e.g., pasture and hay planting, prescribed grazing, range planting), and feed management that reduces methane emissions. CSA practices related to forestry management did not have any resources found in this search.

Conclusions/ Recommendations/ Implementation

Research publications were the main type of communication material found. This implies that most of the information has not been fully conveyed in more accessible communication materials such as printable extension publications or e-newsletters. Most information also lacked references to CSA, potentially limiting extension agents' ability to find relevant resources that link to actions or practices that farmers could adopt. This research emphasizes the need for supplementary resources, such as well-designed printable materials, to support the adoption and diffusion of agricultural practices like CSA. Increasing the amount of resources available may improve and increase extension agents' behavioral control and their ability to find or share information and, in turn, lead to higher adoption rates of CSA (Leach, 2018).

Due to the limitations and scope of this study, further research is needed. The quality and the level of trust in the content found were not assessed. These two factors influence people's decisions when sharing information (Settle, 2017). Further research is needed to evaluate how content availability affects extension agents' information-seeking and sharing behavior on CSA practices with farmers.

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