

GPT's inaccuracies in agriculture could lead to crop losses and food crises

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Dr. Asaf Tzachor, Founder of the Aviram Sustainability and Climate Program at Reichman University, along with researchers from the US, UK, Kenya, Nigeria, and Colombia, scrutinized the reliability of the

information and professional advice provided by the popular chatbot ChatGPT (versions 3.5 and 4.0) to farmers in Africa. The researchers identified inaccuracies that could lead to agricultural missteps and crop losses.

In their [article](#) for *Nature Food*, they caution against the unmediated use of generative AI models in agriculture, fearing that farmers might implement flawed recommendations that could trigger food crises. Instead, the researchers recommend a more optimal development process for AI models in agriculture that includes thorough monitoring and testing before these models are widely implemented.

Shortly after the launch of ChatGPT in early 2023, Dr. Tzachor convened an international team of researchers from agricultural research centers in Nigeria, Kenya, Colombia, France, England, and the United States. They observed that farmers in developing countries had started consulting the artificial intelligence model for professional advice on agronomy and botany.

These farmers, hailing from small to medium-sized farms across equatorial Africa, Southeast Asia, and South America, have access to the Internet and the OpenAI user interface. The research team sought to assess whether the innovative chatbot could supplant, or even substitute agricultural extension agents who train and consult farmers.

These agents, known as "extensionists," include hundreds of thousands of professional agronomists and botanists, plant disease experts, and advisors on irrigation, fertilization, marketing of produce, and trade.

"Extensionists have been essential in disseminating advanced agricultural knowledge, and in many instances guide small farmers around the world in implementing methods for sustainable intensification of crops. They hold conferences and seminars on new herbicides and pesticides, provide

advice on irrigation and fertilization strategies and planning field experiments, and recommend local marketing channels and export strategies for [agricultural products](#)," explains Dr. Tzachor.

Globally, approximately 570 million small and medium-sized farms need training in various agricultural fields. However, extensionists often face significant challenges, especially in developing countries. These challenges include [language barriers](#), translation issues, poor road infrastructure, lack of public transportation, and outdated or nonexistent communication networks.

Agricultural consultants struggle to reach small and remote farms, while small farmers in Africa and South America find it difficult to attend professional seminars hundreds of kilometers away. Extension agencies, often based in capital cities, lack the resources and personnel to update their consulting materials and stay current with new methods.

Against this backdrop, the research team explored whether a generative AI model could compensate for the lack of agricultural advisory services. However, what began with cautious optimism ended in misguidance, inaccuracies, and stark warnings to users.

First, the researchers tasked the chatbot with recommending control and treatment measures for the fall armyworm, a harmful insect that neutralizes plants' defense mechanisms and causes billions of dollars in damage to corn crops worldwide. OpenAI's older models (3.5 and 4.0) provided ambiguous advice on the use of pesticides.

In another series of questions, this time posed by cassava root farmers in Nigeria—Africa's most important cassava producer—the researchers evaluated recommended methods for cultivating the plant, which plays a crucial role in the nutritional security of tens of millions of people on the continent. In this instance, ChatGPT suggested the use of herbicides, but

erred in the timing of chemical application, which would lead to crop damage and food crises if the farmers were to follow its advice.

"The problem with our findings extends beyond the errors of the algorithm itself," according to Dr. Tzachor. "Many had forewarned us about potential errors and inaccuracies. The fundamental problem is the absence of any safeguards against the widespread use of Large Language Models, and AI more broadly, in a system as sensitive as agriculture.

"There is no oversight of how such models are used, no evaluation of their context-specific suitability, no accountability for the consequences of incorrect use or for the actions taken based on their recommendations, and in general, no bearing of responsibility.

"In the case of the current study, we're not discussing using the chatbot for composing a song, a screenplay, or a thesis. We're dealing with food security and the management of farms. While the allure of the algorithm is clear, it involves substantial risks."

In response to this challenge, the researchers proposed an idealized development and deployment process for generative AI models in agriculture.

Dr. Tzachor, Acting Dean of the School of Sustainability and the Academic Director of the Aviram Sustainability and Climate Program at Reichman University, "On the one hand, we see farms and extensionists consulting the freely available AI model. On the other hand, this usage involves errors, uncertainties, and estimates that farming cannot tolerate.

"Skeptics and critics talk about inaccuracies, but few address the consequences of these inaccuracies for vulnerable populations, such as smallholders, in critical sectors such as agriculture. Furthermore, the issue of liability, the question of who is responsible for ensuring the safe

use of these models remains largely unexamined."

More information: A. Tzachor et al, Large language models and agricultural extension services, *Nature Food* (2023). [DOI: 10.1038/s43016-023-00867-x](https://doi.org/10.1038/s43016-023-00867-x)

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