

Agritech artificial intelligence - Bio secure growing to avoid heavy metal contaminates.

Steve Maxwell, Vancouver B.C



British Columbia, Vancouver, Jan 31, 2021 ([Issuewire.com](https://www.issuewire.com)) - It is fair to say that our world has become obsessed with health in an unprecedented way. Popular food chains are eager to add plant-based options to their menus, brands are stocking grocery aisles with vegan, gluten-free, or free-range alternatives, and at one point there was a shortage of celery after an exciting thrill of juicing. It seems that as a population—and perhaps it is truer for the western world—we are more concerned about what we are putting into our bodies. And while regulating our diet in this way is a commendable and important practice, at [Maxwell Capital](https://www.maxwellcapital.com), we believe that optimizing healthy food consumption starts on the farm. More specifically, how are farmers making the best agricultural choices to avoid negative effects of the healthy foods we do purchase? Well, the simple answer is biosecurity. A set of procedures designed and implemented to manage the risk of disease and harmful biological agents on humans, animals, the environment, and its cohorts, biosecurity is the ultimate defense mechanism.

Among any given agricultural landscape, farmers have encountered and may often be exposed to various kinds of diseases and hazards if they are negligent in their biosecurity advocacy. Some diseases that previously resulted from plants and livestock include E. coli, Methicillin-resistant *Styphylococcus aureus* (MRSA), which is a type of bacteria, and *Campylobacter* and *Salmonella*. Although these diseases are more notorious and have been heavily researched, farms are still at risk of contamination due to microorganisms, disease agents (viruses, bacteria, and fungi) parasites, and infectious agents. And it is not hard to see why it is important to get them under control—they pose serious global health risks, but they are not the only hazards that farmers have to look out for. Often considered a lesser threat due to the diversity in type and effect, heavy metals also pose a risk to humans, animals, and the environment if contamination occurs during the growing process. Some metals that are particularly noteworthy include arsenic, iron, lead, cadmium, chromium, copper, zinc, nickel, and mercury. Not all heavy metals are created equal; thus, while some are immediately harmful

upon consumption, others are not toxic to humans in small quantities and are actually essential for good health (zinc and magnesium for example). “In plants, uptake of heavy metals depends on the plant species and bioavailability of the metal in the soil. Since most of the ingestion of heavy metals in humans occurs from the consumption of plants, addressing how plants acquire heavy metals can aid in controlling heavy metal toxicity.”^[1] Agricultural Technologists have taken this mission of avoiding metal contaminants in plants personally. Various Artificial Intelligence initiatives have become a normal part of farming and we will spend the rest of the article looking at how a few of them are fulfilling the mandate of biosecurity.

IBM Agropad

In 2018, IBM introduced the Agropad prototype to the market at a time when farmers had growing demands for more efficient and effective soil testing. A technology that can fit into any coat or trouser pocket and often described as the size of a business card, the Agropad can rapidly and remotely analyze soil samples for chemical composition. Farmers can sample either a drop of water or a soil deposit and place it on the Agropad. According to the IBM research team, “the microfluidics chip inside the card performs on-the-spot a chemical analysis of the sample, providing results in less than 10 seconds.” The real work happens at the back of the card. There is a set of circles on the back of the card that operates as the “brain” of the analysis via a colorimetric test. Each color represents the presence of a certain amount of a chemical or heavy metal that may be present in the sample. The Agropad is compact and sustainable. A farmer can download the app to her smartphone, take a single image of the Agropad and he will receive the chemical results in a matter of seconds. This device has been effective in detecting heavy metals such as aluminum, magnesium, nitride, and chloride, to name a few.

Geocoding

Agriculturalists, farmers, and investors are engaged in ongoing collaboration to improve soil and plant health and directly reducing heavy metals in soil and water through artificial intelligence. One of the ways they are teaming up to tackle this initiative is the generation of newly geocoded soil data through a process of “characterizing microbial diversity” paired with already existing research. The intent behind this approach is to make sense of ground level and above ground logistics that will be indicators of soil health.

Looking Ahead

As a result of an increase in agricultural and industrial runoff, the presence of heavy metals in water and sediments have grown exponentially. Current AI models to target the issue have materialized as predictor devices, algorithms that compute the presence of heavy metals, and architecture that significantly reduces the need for manpower that would typically require farmers to analyze soil and water manually. At Maxwell Capital, we aim to partner with startups that are developing AI that can contribute to the cause. The need is material and ongoing and research has been impactful in gaining more insightful information in fulfilling the mandate of biosecurity.

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