Azadi ka Amrit Mahotsav ISAS Webinar Series: A few Excerpts

Future of Food-Feeding 10bn people by 2050

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Our World Needs Help!

About 800mn people go to bed hungry each night. Approximately 700mn people fall ill every year because of eating tainted food. And about 2bn people suffer from micronutrient deficiency. This is a world of 7.8bn people. By 2050, there may be 10bn of us. We radically need to transform our food production system - grow more & grow better without costing our planet.

Humans learned the science of agriculture about 10,000 years ago. Fast forward to today, we are using 60% of all arable land on Earth for agriculture. While this provided the baseline necessity for human existence, all this happened at the cost of sacrificing nature's ecology. Growing concerns about climate change and increasing carbon footprint are further forcing governments, organizations, consumers & institutions worldwide to focus on food systems which accounts for roughly 25% of global greenhouse gas emissions. Reversing this footprint will play a key role in shaping the future of humanity. We understand the need for the co-existence of a fine balance between vibrant biodiversity & agriculture-food ecosystem, today, more than ever. As a civilization, we need to leverage science & technology to solve some of the grandest challenges that humanity faces today & may face in decades to come - clean air, clean food, clean water; building a home where both people & planet win as one.

Over the last seven decades, we have made significant advancements in our understanding of plants—how they live, share resources, peers they like to grow with, and more. This, combined with leaps made in sensor technology, biotechnology and chemistry, has paved the way for some necessary additions to our millennium-long agriculture practices. For instance, at Absolute, we began by mapping variety wise crop behaviors in four segments collecting hundreds of data points across them on daily basis.

Plants are living, just like us. If we can understand the triggers that causes a plant to build it's biomass, flavor profile & texture; we may as well enable it to function better, naturally. That was the core idea behind the crop recipes.

1. **Plant Nutrition:** Plant Specific diet plan, sufficing their micro and macronutrient requirements like NPK for faster growth and development with minimal use of synthetic inputs.

2. Light: Plant-specific spectrum choice and photonic flux requirement. Light recipe also determines the sleep cycle, and everyday requirements of light (Daylight Integral).

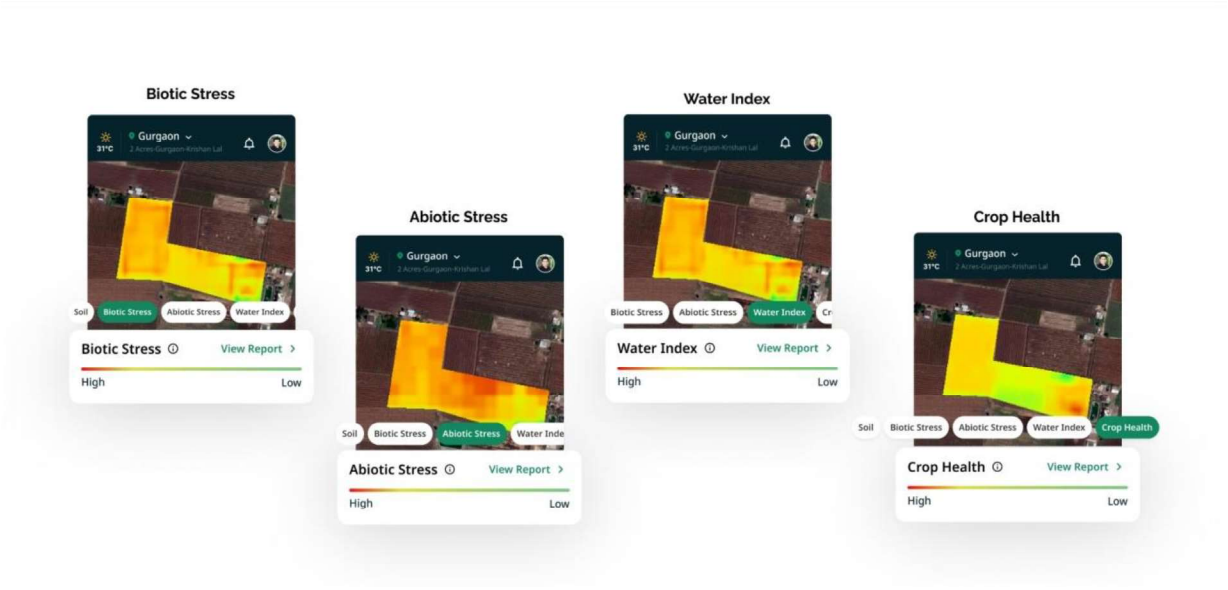
3. Environment: The ideal living environment for the plant, specific to its variety. There are over 400 environment-specific data points like pH, EC, TDS, OD, humidity, water pressure, crop stress, wind pressure, etc that can be optimized for better crop growth & development.

4. **Interaction:** Interaction related datapoints like CO2, Chlorophyll Concentration,, etc. helps with better understanding of what crops to be grown together,

Technological advancements have helped us build an agriculture system that is resilient and sustainable. Today, farmers, as well as large-scale agricultural businesses, have access to precise data through advanced technologies such as satellite imaging, sensor suites, drone technology, and biomarking, which can help increase crop productivity, quality, nutritional value and flavour profile.

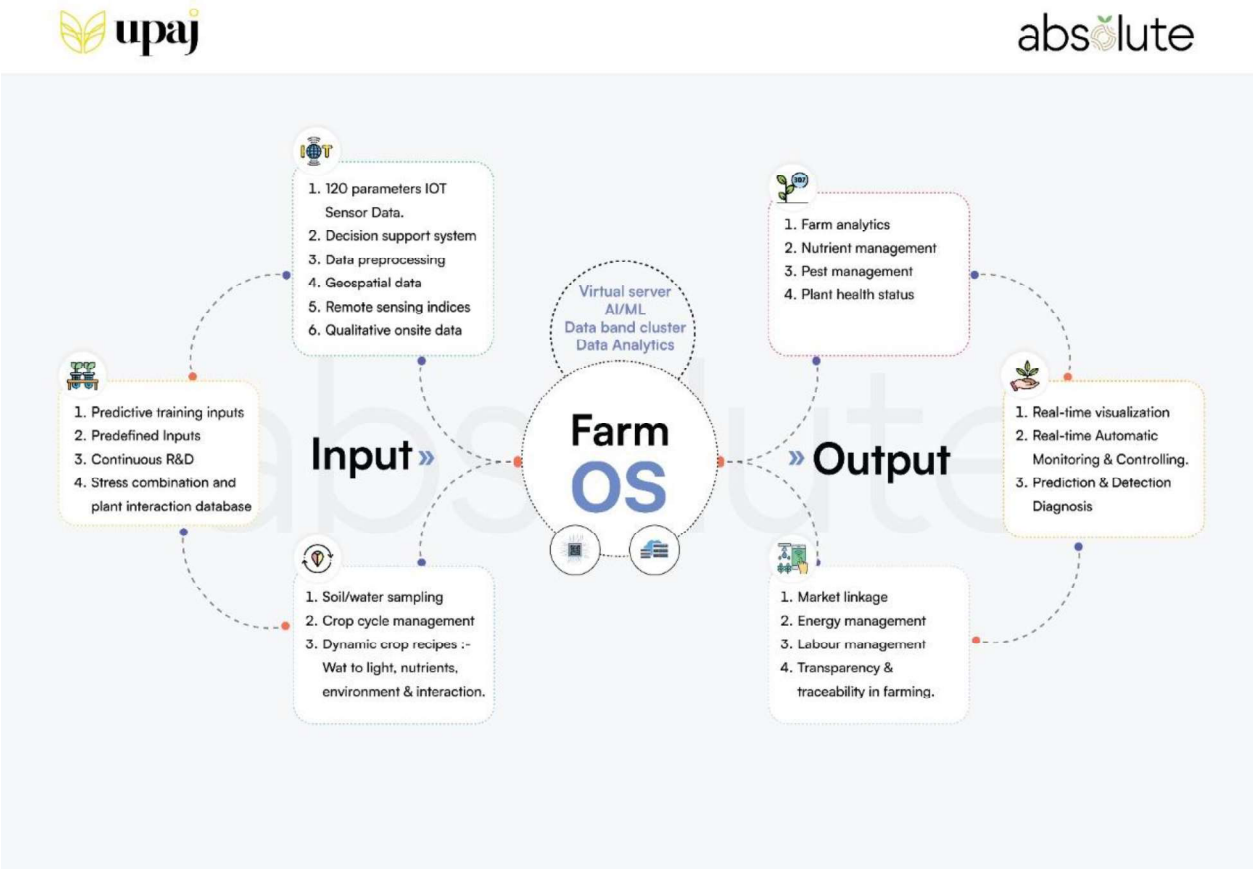
It is vital that these technological advances be merged with emerging trends in biological sciences. Advances in Omics, for example, play a key role in providing better insights into the abiotic and biotic stress tolerance and resistance in plants. Similarly, new explorations in systems biology shed light on how to improve consistency and predictability in plant breeding with faster production of higher quality food crops.

Absolute's Universal Farm OS is the powerhouse of data streams captured through satellites, IoT, Drones, and proprietary sensor suites provided to the grower. This real-time data enables growers to auto-analyze 100+ parameters personalized to their farm, crop, and geography. Through the lens of biology; weather, microclimate, and soil data are also the essential variables to determine and reflect the biotic, abiotic, and irrigation stress - which happen to be the grower's most fundamental problems during the growth cycle.



Absolute for instance is merging plant science with epigenetics and molecular biology to further leverage data and generate meaningful insight into what is precisely happening on the grower's

crop at each step in the process. Such personalized zero ambiguity insights enable growers to take better decisions for their crops - in fact, making the growing process completely autonomous while promoting carbon sustainable methods of farming.



Microbial applications further are critical in solving major agricultural and environmental issues. There have been significant biological breakthroughs leveraging microbial innovations for sustainable agriculture. Combine this with a deeper understanding of plant biology, epigenetics and molecular biology, and we have a way to improve farmer livelihoods, soil health, and productivity.

Merging all of these insights with digital technologies is the best way to ensure the viability of those technologies in real-life applications on farms. This means access to such data is

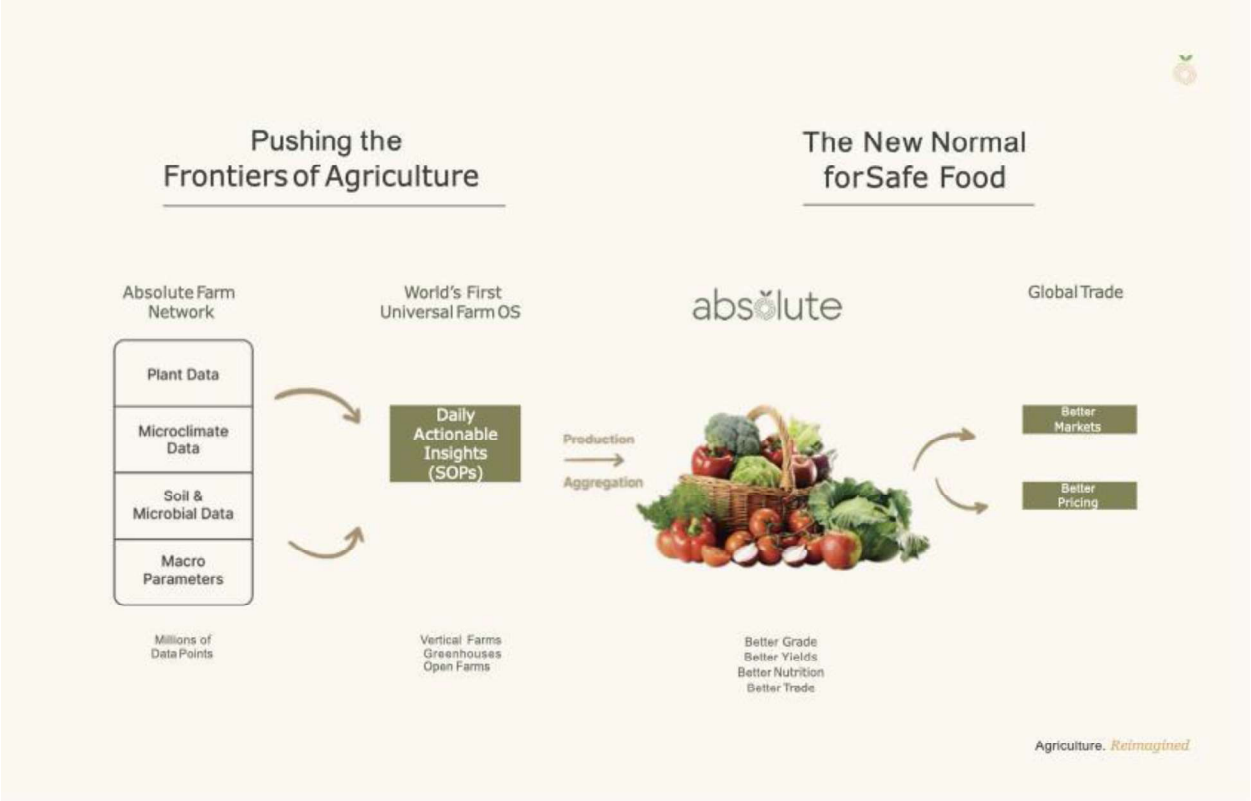
paramount. We're trying to do our bit at Absolute, building the world's largest plant bioscience platform to curate the most concise bio ag data library, which will further equip new technologies with pathbreaking bio intelligence.

We are one step closer to our collective goal to grow more and grow better, thanks to the introduction of vertical farms and greenhouses—methods that are proving to be especially effective for countries with adverse growing environments. . The problem of insufficient light can be resolved with the use of grow lights, which have become almost a necessity in these kinds of setups. At Absolute, we built one of the world's most economical grow lights, reducing the CapEx and OpEx by over 50% of the global average.

These semi-indoor and indoor farms use less land to grow exponentially more food per hectare. It is therefore extremely important to optimize their cost, productivity, and profit margins to scale them further. Scaling these solutions globally could be a game changer in fighting climate change, land use change, and increasing carbon footprints.

In the world we live in today, we're faced with the unique predicament of the paradox of hunger. We talk about working to eliminate hunger and starvation resulting from crop failure or low crop productivity. But at the same time, there coexists the contradictory concept of obesity. More than one-third of the global adult population is obese and a third of all the food that is produced is either lost or wasted.

We need to build an optimal trade ecosystem that addresses the issues of food losses and food security. And while ensuring equal access to farmers' produce around the world can be a transformative step, we also need to create livelihood opportunities for the farmers and help them increase their incomes. This is the only way communities at the bottom of the pyramid will be able to feed themselves safe, nutritious and healthy food. While we do that, it is imperative & almost morally obligatory to provide consumers worldwide with access to safe and healthy food. At Absolute, we are working to solve just that thorough a model that strikes right at the core of the above problems.



Earlier, we talked about the fine balance between strengthening the food ecosystem and preserving our biodiversity. Standing on the edge of this precipice can be daunting, to say the very least. But if we look at it from a different perspective, we have the opportunity—and the capability—to transform our world back to how nature intended it to be.

Today, we have a generation-defining opportunity before us. If countries can become self-reliant and come together to transform agriculture globally; it would be our biggest chance to build a shared future, one where people & planet can thrive in harmony. Where there is abundant clean air, clean water, and safe food for all of us today and for generations to come.

As a race, we must realize we are not alone. Our lives depend on the coexistence of the entire food & life chain in harmony. For 1700 yrs, India was on the richest civilizations in the world & we produced some of the most advanced practices by the standards of those days in agriculture. It's time for an exponential shift to revive that pursuit from India, for the world.

Brief Biosketch of Agam Khare

Agam is the Founder, CEO at Absolute - a pathbreaking Plant BioScience & Precision Ag company. Prior, Agam ran India's leading Industrial Robotics & Factory Automation company working across various sectors - Food & Beverage, Pharma, Auto, Oil & Gas, Steel & Cement.

Between 2010 & 2012, Agam worked very closely with the 11th President of India & World Renowned Scientist- Late Dr. APJ Abdul Kalam on building moonshot innovations to solve some of the grandest global challenges faced by humanity.

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