[Test] FindingPheno Newsletter Dec 2021

1 message

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Newsletter 5 | December 2021

FindingPheno

I am finally back writing some actual researched content on the blog. This is expected to continue over the winter as I work through my list follow up articles unpacking some of the points made here. It turns out that sustainable farming is really interesting from a lot of different angles, so many innovative and practical ideas to explore!

Big data down on the farm

Our need for food is growing, with global demand expected to increase by 70% by 2050 thanks to population growth and demographic change. Using our current farming methods to meet this extra demand would require new farmland covering twice the size of India, clearly not a good idea. Meanwhile, the agricultural industry is the second highest greenhouse gas emitting industry, accounting for more than 10 gigatons of CO2 equivalents in 2014. Add in soil degradation, over fertilisation, pesticide residues, increasing water scarcity, and loss of biodiversity, and we have a real sustainability problem. So we have a dilemma: how do we produce enough calories to feed the world using the land we already have while still reducing GHG outputs and environmental impacts?

The EU is addressing this dilemma with the European Green Deal, and especially the Farm to Fork Strategy, providing funding and governmental support for the transition to more efficient and sustainable farming methods. This is supported by the EU Soil Mission focusing on the protection and restoration of healthy soils underpinning this green transition. Together these policies have ambitious targets for reduced pesticide and antimicrobial use, reduced GHG emissions, and

prevention of nutrient loss or over fertilisation. The technological innovation needed to meet these targets requires a deep understanding of how the ecology and biology of the entire farm ecosystem works together and data, lots and lots of data.

Agriculture 4.0

It has been widely recognised that big data can revolutionise farming practises through precision farming, i.e. measuring and tracking many on-farm parameters in real time to support decision making. The idea is that gaining a precise picture of how their farm is performing will allow farmers to continually optimise trade-offs between farm inputs (i.e. fertiliser, pesticide, water), food yields, GHG emissions, and profits. This movement has been enabled by new technologies such as autonomous vehicles, satellites, field sensors, and analytical testing methods, coupled with increased access to mobile devices and network connectivity. The importance of biological data is also being increasingly recognised, where nutrient conversion, disease resistance, climate resilience, yields and productivity are all strongly influenced by both microbiome and genetic background of the plant or animal being farmed.

So what's the problem?

Despite this potential, precision farming is still held back by significant gaps in data generation or access. For example, we still lack fast, cheap and accurate methods for measuring soil quality, plant nutrition or microbiome status. The technology that does exist is not evenly spread across the globe, creating data deserts. Meanwhile, much of the data that is being collected is hidden behind paywalls or locked in proprietary formats and a lack of interoperability prevents the integration of data from different sources.

And lastly, just collecting and collating lots and lots of data isn't enough, this information needs to then be made useful for farmers. The different data types need to be analysed and interpreted in light of the relevant biological and agronomic context to then find actionable insights within the data – thus giving farmers concrete advice or actions for managing their farms. Finding these insights requires sophisticated statistical tools and analysis frameworks such as those being developed by FindingPheno. By untangling the complex biological interactions underpinning different food production processes we aim help enable this transition to more precise and sustainable farming practises.

Read and comment on the full post here.

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