Customer Story

Syngenta

Challenge

Increase efficiency, minimize costs and optimize products by disseminating statistical methods to R&D and production centers worldwide.

Crop science for the modern world

Biotechnology giant Syngenta brings science to the age-old art of agronomy with cutting-edge statistical methods and sustainable technologies

It wasn't all that long ago that farmers relied primarily on almanacs for annual agricultural insight, as they had since as early as the middle of the second millennium BC. But the advent of biotechnology and its application in today's thriving agrichemical industry has changed all that. Seeds are now heartier and crop harvests bigger than ever before; such innovations are needed to feed the ever-increasing human population.

Syngenta, now one of the world's leading agribusinesses, creates new seed varieties and hybrids every year, in addition to designing traits and advancing formulations that fight resistance. Many attribute the company's success to a marriage of science and art. Though the art has been there since the days of the almanac, the science is a product of more recent innovation in everything from formulation chemistry to quality to process engineering to the development of new agronomic practices.

David Barnett is Senior Formulation Chemist, Data Scientist and Robotics Chemist for Syngenta Crop Protection at its Jealott's Hill R&D site near Reading in the UK; Dirk de Bruyn Ouboter is Global Measurement Science and Process Performance Lead at Syngenta's Basel-area Technology & Engineering facilities. These two scientists touch very different aspects of Syngenta's global production, yet both share a sense that precise science and analytics have a home at Syngenta. And for both Barnett and de Bruyn Ouboter, JMP® has been the mechanism by which they are able build scientific methods into their work via statistics. JMP is now used widely across the entire global organization; from field operations to its nearly 150 R&D sites, Barnett says Syngenta has employees of all types: everyday JMP users, power users, JMP Pro users.

Robotics technology has transformed formulation chemistry via automation and design of experiments

One of the largest agricultural research centers in Europe, Syngenta's Jealott's Hill site is designated primarily for R&D. There, Syngenta's elite formulation robotics, first launched in 2009, represent a major breakthrough in formulation chemistry. Thanks to automation, scientists like Barnett are able to evaluate hundreds of agrochemical formulations every day, ultimately boosting yield multifold.

JMP is a natural extension of the work done by Syngenta's formulation robots. "I use JMP to design and analyze experiments that we generate for a formulation robot," Barnett says. JMP helps optimize formulations by guiding a strategic experimentation process vis-à-vis design of experiments (DOE). "Instead of the usual two or three samples people can make in a day, we use the system to make two to three hundred," Barnett says. "Handling all that data is quite important, and we use JMP to do it." Moreover, Barnett says JMP is also an invaluable tool for image analysis that brings speed and ease of use to other traditional formulation techniques.

Process analytics boosts improvements in safety, quality and efficiency performance

De Bruyn Ouboter comes from a background in physical chemistry and engineering. Now based at one of Syngenta's largest Technology & Engineering centers in Münchwilen, Switzerland (near Basel),

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de Bruyn Ouboter works primarily on what he terms the "seed end of the business." He's part of a global performance team that interfaces between production and R&D, spearheading strategic initiatives to overhaul quality, safety and efficiency across Syngenta's many seed processing facilities. In addition, de Bruyn Ouboter also performs diagnostic functions, making sure new technologies are being implemented correctly at production sites worldwide.

"As a chemist coming into the world of agronomy, it's less data-based and a bit more anecdotal," he says. "This is where JMP comes in – why I use JMP. The only way to [illustrate the case for data-driven decision making] is telling a story with the data and with graphics and pictures. That's where JMP is really helpful: turning data and numbers into graphics that production managers can see and better understand."

For a global company like Syngenta, it's to be expected that operators and production managers in Seeds come from a multidisciplinary background. "Though [operators] may have broad experience, scientific thinking may not be so much a part of it," de Bruyn Ouboter says. "That's why they say 'turning an art into a science.'" Before the advent of modern DOE, people working in the fields and local production sites relied on intuition and learned knowledge to make decisions. "Before JMP and DOE, they designed experiments based on historical trends," he says.

And Barnett agrees: "One of the big things is data visualization. That's the part of JMP that helps us turn the art into science. You can put all these numbers into a picture – it's the best way to explain what you see in the data. In other words, it's a discussion when you're handing back local operators' data. You can explain why something is happening, not just say 'use these methods, they're the best.'" This is how scientific knowledge is transferred – from R&D site to production site and from production site to heartier crops and higher yields.

New technologies and tools facilitate productive internal discussion

In an industry where most production goes on outdoors, even the most airtight statistical approach can have its limitations. But just because some environmental variables can't be controlled doesn't mean there's no need for statistical models. In fact, that's why modeling and looking at the data for answers is so important, de Bruyn Ouboter says. "There's been a movement toward combining data from a lot of different sources (like agronomic data service networks and satellites) to make this prediction better. We're really just scratching on the surface of what is possible.

"We're finding and investigating new technologies and bringing them to Syngenta field sites so local operators can use them. And it also works the other way around: We visit and see how they do things. Quite often it's discussion with people on-site who do the work every day. Sometimes they have a concept in their mind, but then what we find using statistical methods destroys their concept. But if we have a graph, it's the best medium. We can create models with their data and they see what is possible. They begin to understand the science aspect, rather than just the apparent story behind their decisions."

With the installation of new technologies, Syngenta now collects more data than ever at all its global sites, no matter how small. "On-site systems record information, though not everyone looks at it," de Bruyn Ouboter says. But JMP has proven its worth; highlighting how small variables – even something as insignificant as leaving a facility air gate open or closed – can actually affect outcomes. If you buy into that idea, then you can figure out how to optimize processes. And in the long term? Syngenta hopes that boosting productivity with better science will ultimately provide a more stable, more sustainable global food supply chain.

Solution

Deploy analytical decision making strategies, from design of experiments to quality control and process reliability. Use JMP® to build compelling models; thereby gaining buy-in from local managers formerly reliant on intuition-based reasoning.

Results

Syngenta has paved the way for a multitude of new innovations that move crop science toward a more sustainable future.

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