Soil and Agriculture Review Guide (Chapters 13 and 14)

Be able to:

1) Recognize and describe the soil profiles
2) Understand the properties of soil and what determines soil quality (texture, air space, friability, water etc.)
3) Understand how to interpret a soil triangle
4) Know how climate (biomes) affect soil profiles and fertility
5) Know the qualities and names of the different layers of the earth
6) Understand the basics of plate tectonics
7) Be able to distinguish between chemical and mechanical weathering and examples of each and how humans affect each.
8) Understand soil erosion and how humans affect it
9) Understand pros and cons of using chemical fertilizers
10) Understand the different types of agriculture and the pros and cons of each
11) Understand the difference between persistent and nonpersistent pesticides
12) Explain IPM - what it is, benefits and practices
13) Understand what the Green Revolution is
14) Know which laws are associated with pesticides
15) Understand what macronutrients plants need

From the Editor

The Revolution Will Be Green

> FOOD, ALONG WITH WATER AND ENERGY, WILL BE ONE OF THE DEFINING ISSUES OF OUR TIME.

In the waning days of World War II, a plant biologist named Norman Borlaug went south to Mexico. Ostensibly, he arrived there to teach modern farming methods at the behest of the Rockefeller Foundation. But Borlaug, described by most as a highly determined man, did much more than that: He started and led perhaps one of the most profound revolutions the world has known.

The Green Revolution is a catch-all that describes advances in plant breeding, chemical fertilization, pest control, and irrigation, particularly from the late 1940s to the early 1970s. Those innovations—including Borlaug's contribution of high-yield short-stem wheat—helped grow agricultural productivity more quickly than the global population. And over a few decades that difference saved perhaps a billion people from starvation and millions of acres of wildland from the plow. Borlaug won the Nobel Peace Prize for his work in 1970.

Today the world is in need of another green revolution. Gains in agricultural productivity have slowed or stopped in many places. Yet the global population steadily marches upward. According to the World Bank, the planet will need to produce 50 percent more food in 2050 to feed a population of 9 billion. At the same time, climate change could trim existing crop yields by up to 25 percent. Food, along with water and energy, will be one of the defining issues of our time.

As we explore in this month's cover story, that next revolution is already afoot. Today farmers are using sensors, drones, and robots to monitor and tend to fields as precisely as possible, reducing waste and improving yields. Genetic engineers are creating and breeding plants more productive than even Borlaug could imagine. (I can almost hear the scribble of anti-GMO letters right now.) Seafood farms are sprouting up in Indiana, and even meat is being rethought. Can we 3D-print it? Pretty much. Just take a look at page 41.

In a sense, the revolution taking place today is an extension of Borlaug's movement but retooled for our digital age. Instead of mass production, today's buzzwords are efficiency and optimization. Like anything, this technology—lovingly called "agtech" by the startup set—has its limits. But if one thing has become clear to me in pursuing our feature, we haven't even begun to approach them.

Enjoy the magazine.

Cliff Ransom
Editor in Chief

Contributors

Clay Dillow
Each time Clay Dillow reports from the Pentagon or a massive agency like the FBI, he's surprised to find the place "made up of real people," he says. While reporting "To Catch a Bombmaker" (page 54), a scientist explaining the nuances of roadside bombs excused herself to go retrieve her puppy from the vet. The juxtaposition—from bomb tech to dog lover—says Dillow, was "humanizing."

Ilima Loomis
Taking on "The Search for Dark Matter" (page 26), was a no-brainer for journalist Ilima Loomis. "That a quarter of the universe can't be accounted for is irresistible," she says. Finding the stuff that holds our universe together is no easy task, but Loomis says they're getting close. In fact, she's already geared up for the next great piece of the puzzle to figuring out our universe: dark energy.

Alexander Wells
Alexander Wells learned plenty while illustrating our "Brilliant 10" feature (page 46). High on the list: the omnipresence of microbes in our lives. "They look amazing, but I fear I will never unsee how many bacteria live on everyday surfaces," Wells says. "By the end of it, I was worried that I was going to end up a germophobe like Howard Hughes!"

Suzanne Lenzer
To gather material for "The Future of Food" (page 34), stylist Suzanne Lenzer found herself at a farm in Bushwick, Brooklyn, where lettuce grows in water tanks. Lenzer has been known to wax poetic about heirloom tomatoes, but when she saw the lettuce, she raved. "These hydroponic heads had stunningly beautiful white root structures," she says. Some foods just bring out the nerd in us all.

RANSOM: MARIUS BUGGE; COURTESY CONTRIBUTORS