BioSpectrum the business of Bio & Health Sciences

'Biotechnology: A tool for future food security'

05 June 2014 | Features | By BioSpectrum Bureau

'Biotechnology: A tool for future food security'

All of these efforts are important, but the most critical arena of operations in the effort to preserve our planet is one that may surprise you: the farm.

So huge is agriculture's environmental footprint that its success or failure in achieving sustainability will be a key determinant of our planet's fate.

Policymakers and opinion leaders everywhere need to understand: Agriculture is at the pivot point of the 21st century.

The scarcity of water and land

Tremendous progress has already been made. But we need much more. Consider water.

The basic facts are very simple. We depend on fresh water to sustain life, yet the supply is finite and relatively small. Just 2.5 percent of all the water on the planet is fresh, and most of that for various reasons is unavailable.

Moreover, humanity is consuming water faster than ever-at more than twice the rate of population increase in the last century. Meanwhile, projections call for a global population increase of more than 2 billion between now and 2050.

By 2025, the United Nations forecasts, two out of every three people will live in water-stressed regions.

All of us who work in agriculture have a huge responsibility here. Some 70 percent of fresh water is consumed by food production. We always have depended on farmers to be good stewards of the land, but today's farmers are also responsible for sustainable use of other resources too-water included.

Another challenge lies right under our feet: having enough productive soil to grow food. To feed today's population, we

already use a land mass the size of South America. But feeding the globe's larger population by 2050 could require another land mass of that size.

No other South America is waiting to be discovered, and we should work to preserve the remaining rainforests and grasslands. But we have many opportunities to meet this food supply challenge without using more land.

More efficient distribution and storage of food need to be part of the answer, but the most immediate and important opportunity is greater productivity.

Three tools for future food security

Over the last 30 years, farmers across the globe have doubled corn production while reducing the total amount of land, energy and water invested by 30 to 50 percent.

With a combination of existing and new tools, we can replicate that kind of performance with other crops.

Three good examples are advanced irrigation, no-till farming, biotechnology and advanced breeding.

1. **Advanced irrigation:** Some traditional irrigation methods waste a staggering 35 to 50 percent of water used. Through better irrigation systems and better management practices, we dramatically can increase efficiency. Drip irrigation, in which water is applied directly to a plant's roots, can limit waste to 5 or 10 percent.

Additionally, our rising ability to crunch "big data" provides precise information on local soil and weather conditions, leading to better decisions about how much water to use and when.

Farmers worldwide are trying to grow "more crop per drop." Monsanto recently committed to a 25 percent increase in irrigated water-use efficiency of our operations and contract farms by 2020, which we project will save between 30 billion and 80 billion gallons a year. With today's technology, such goals can be met.

2. **No-till farming.** Growing crops without having to tear up the soil offers a bouquet of environmental advantages. No-till, enabled by genetically modified seeds, keeps vast quantities of carbon harmlessly sequestered in the ground while also conserving water and reducing soil erosion. No-till also means a reduction in the burning of fossil fuels for tractor trips back and forth through fields.

No-till represents a potential savings to greenhouse gas emissions of some 26 million tons every year - the equivalent of taking all of California's 12 million cars off the road.

3. **Biotechnology and advanced breeding.** Through both genetic modification and advanced breeding techniques, scientists are developing seeds that better resist drought, insects and other pests. These seeds give farmers a chance to adapt to climate change and grow more with less.

During the US drought of 2012, the combination of GM crops, advanced breeding and improved agronomic techniques helped keep corn yields nearly 40 bushels per acre higher than they had been the last time the Corn Belt dried up that badly, in 1988. That nearly 50 percent improvement represented enough calories to feed about 1 billion people for more than six months.

These are only a few of the tools that farmers will need to meet our globe's growing demand for nutritious, affordable food - sustainably. More are needed from companies, universities, research centers, foundations, civil society, governments and farmers themselves.

We also need more partnerships among these various participants; fortunately, signs of that cooperation are growing.

If we all understand the stakes involved in making agriculture sustainable, there is every reason to believe we can do it.