

# New day for precision gene placement



By TOM J. BECHMAN

**G**ET used to hearing the term Exzact. It's the name Dow AgroSciences gave technology they believe could change the world. It certainly has the potential to change plant breeding and genetic engineering in ways early biotech engineers only dreamed about.

Vipula Shukla, project leader for Exzact, describes what's unique about this new technology, sometimes referred to as the zinc-finger technique.

"It's the only technology available that can target any sequence in the genome of a plant," she says. "The technology is very precise. You can decide ahead of time what gene you want to alter or what native gene you want to remove, and then do it."

## Gene introduction

The early days of biotechnology and genetically modified traits take us back to the "gene gun" — literally, a gun that fires particles of gold or tungsten metal into plant tissue. The metal particles are shot through a solution of DNA surrounding plant cells. While it's more complicated than it sounds, notes plant breeder Dave Nanda, slivers of metal literally pass into living cells, taking along the desired DNA.

The biggest drawback, says Nanda, president of Bird Hybrids, Tiffin, Ohio, is that the desired target genes are inserted at random into living cells. It takes painstaking work to find a plant that has the properties the researchers are seeking.

Then came insertion of genes using *Agrobacterium*, a bacterium that causes crown gall disease in plants. These bacteria transfer genes by infecting plants, but the gene causing the tumor — the result of the infection — is disarmed in advance. While the method is successful and less disruptive to plant cells, it still places genes for traits at random in the genome, Nanda says. And since the bacteria don't infect all plants, there's still a need for the gene gun in some cases.

"Both the gene gun and vector [bacterium] technology are random," Nanda observes. "We can't control the location of the gene. That makes transfer of new traits very expensive and time-consuming because thousands of plants have to be cultured and tested for the presence of the trait being transferred."

## New day

The zinc-finger technology could change all that, Shukla says. Nanda agrees.

According to an article published in the scientific journal *Nature*, Dow AgroSciences researchers, led by Shukla, introduced a herbicide-tolerance gene into a predetermined location on a chromosome in a corn plant. At the same time, they eliminated expression of an enzyme involved in the production of phytate, linked to pollution in pigs.

Nanda adds that this type of technology also could be a game-changing event in the medical field.

"We're actually using this technology as an integral part of our research platform now," Shukla comments. "And we're having discussions with others who potentially might want to use it in the future."

## Behind the scenes

When you read about a company such as Dow AgroSciences either acquiring or collaborating with a small company you've never heard of, it doesn't always seem important.

However, this story began exactly that way, notes Joe Sobek, business manager for Exzact. In 2005, Dow

AgroSciences announced a research collaboration with Sangamo, the California-based company that pioneered the technology.

"We exercised our right to obtain an exclusive commercial license for the technology in June '08," Shukla says. "By then we'd assessed the technology and knew what it could do."



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