

New and inexpensive genomics method takes off

March 20 2012, By Amanda Garris

(PhysOrg.com) -- Genotyping-by-sequencing (GBS), a powerful new technique developed at Cornell, is leveling the playing field in genomics research. Less than a year after publication, it is being applied to answer questions about diverse species, including hops, fox, turf grass, maize, cow, tomato and raspberry.

The GBS protocol, published in May 2011 in the journal [PLoS One](#), allows researchers to generate huge amounts of [genetic information](#). Identifying differences between the DNA of individuals is the first step toward unlocking the [genetic basis](#) for their differences in appearance or behavior.

What sets GBS apart from other equally powerful methods is, in part, a lower price tag. One cent buys about 50,000 data points, which is up to 50 times cheaper than other methods.

"Funding for agricultural [genetics research](#) has always lagged behind that of [human genetics](#)," said Rob Elshire, the technique's developer and the sequencing technology lead in the lab of Ed Buckler, a research geneticist with the U.S. Department of Agriculture Agricultural Research Service and adjunct professor of [plant breeding](#) and genetics. "GBS is an enabling technology -- it's cracking the door open for many underfunded research areas."

The technique's cost effectiveness has been a strong selling point, but the method was also designed to be easy and robust compared with other

DNA typing methods.

"In developing GBS, we ... eliminated as many steps as possible," Elshire said.

The method allows users to collect data on up to 384 individuals in a single sequencing lane, using a protocol with only four basic steps from DNA to data. Because of this efficiency, GBS can generate sufficient data for a thesis, a breeding program or an ecological study in a matter of weeks.

"GBS can generate terabytes of data," said Sharon Mitchell, Institute for Genomic Diversity's (IGD) research and laboratory manager and co-author on the PLoS One paper. "To help users, we have held several workshops mostly dedicated to the pipeline for data analysis and hands-on practice with it."

She added that "Interest in GBS has been snowballing." To keep up with the daily demand for information and assistance for users of the technique, additional staff are being hired, Mitchell said, "and nearly a year after publication, the article remains one of the top 10 most viewed genomics articles on PLoS One."

A Feb. 16-17 workshop on campus, for example, was filled to capacity and attracted participants -- primarily plant breeders, geneticists, animal scientists and evolutionary biologists -- from as far away as New Zealand.

"The aspect of GBS that is most appealing is that it produces tens to hundreds of thousands of genetic markers," said Mitchell. "Most plant and animal breeders are interested in using this plethora of markers to speed up the breeding process in a big way."

To meet the continued demand for training, the workshop will soon be available as a video on the IGD website, and workshops will be offered in India and Africa in the coming year.

The IGD is a nonprofit institute affiliated with the Cornell Institute for Biotechnology and Life Sciences Technologies. Since its establishment in 1998, it has helped organize molecular breeding workshops in Mali, Venezuela, Costa Rica, South Africa, Ghana, Nigeria and Kenya.

Provided by Cornell University

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