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Syngenta claims ownership of rice - but will give data away

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LONDON The Torrey Mesa Research Institute (TMRI) in La Jolla California, the genomics research centre of Syngenta, has announced that it has sequenced more than 99% of the rice genome to an accuracy of 99.5% in collaboration with Myriad Genetics Inc. Syngenta - which was formed in November 2000 by the merger of Novartis Agribusiness and Zeneca Agrochemicals - has used a whole genome shotgun approach with a 6X coverage. It estimates that rice contains 50,000 genes - in comparison with 20,000 for *Arabidopsis*.

"The biggest surprise has been that about 20% of the genes in *Arabidopsis* we can't find in rice," Steve Briggs, Director of the TMRI, told *BioMed central*. "The thinking was that as flowering plants are only about 200 million years old, essentially they're going to have the same genes, just differently regulated and with some duplication - but that turns out not to be true."

This announcement puts Syngenta way ahead of the International Rice Genome Sequencing Project (IRGSP), led by Japanese and US academics, which so far has only 7.5% of the rice genome sequenced - though Ben Burr at the Brookhaven National Institute, co-director of the project, says the work is "accelerating." The IRGSP is using the 'Bermuda Sequence Agreements' developed for the human genome project, aiming at an accuracy of 99.99% using BAC technology - which is slower than the shotgun approach but will ultimately produce a more accurate sequence. Burr said, "We are not going to attempt to do a hurry-up, draft sequence."

Briggs, however, does not think that accuracy is relevant, even academically: "If you looked at another variety of rice, you're not going to have that sequence - it'll differ at around 1%. If you're sequencing at a higher at, you're just sequencing the individual variation."

Rod Wing, Director of the Clemson University Genomics Institutein the US, says the Syngenta data is a "draft", and that its impact on IRGSP "would depend on their willingness to share their data. If it can't be shared, it won't have any impact."

"Monsanto has already provided a [rougher, 60%] BAC draft," said Wing. "So if an arrangement could be made such that we can use the Syngenta data, and the Monsanto data, and then release it to the public, that would be fantastic. And I think a push is now underway in the US and Japan to jointly approach Syngenta to discuss the possibility."

As it happens, IRGSP will hold its annual meeting in Tsukuba, Japan 7-8 February, and this issue and the strategy to be taken with Syngenta will no doubt be hotly debated.

But confounding Wing's hopes, Adrian Dubock, Head of Ventures & Licensing at Syngenta, has told *BioMed central*that the company has no intention of releasing its data to the IRGSP - at least not yet - although it will give away technologies derived from its sequence that may be useful in the developing world.

After all, Dubock told *BioMed central*, "We've achieved this current result six months ahead of schedule, and now we need a bit of time to assess our own commercial interest. Maybe in the future

there'll be some opportunity [for collaboration with the IRGSP], but at the moment we've a time advantage created with commercial money and we're looking for a reward."

Steve Briggs, however, puts a different gloss on the situation. "Our data is publicly available. To the IRGSP or any other investigators around the world. It's just not in the public domain. Think of it like a book or a movie. It's available to you, you can get the book, you can watch the movie; but it isn't in the public domain, you've got to go pay for it. Somebody owns it, and provides access to it. But we're not charging people for access to it for non-commercial uses. So to academics and so forth it's available without charge. But what we require is that if a commercial invention is made from the collaboration, that Syngenta has an option to consider a licence for it."

According to Ben Burr of the IRGSP "The exact language of access agreements will be very important for how many people actually get access. Different universities and different government agencies have different technology transfer agents and different lawyers ... their approach to the language will be very important."

Ron Cantrell - Director of the International Rice Research Institute (IRRI) in the Philippines - said, however "We have no real concerns about Syngenta's approach to IRGSP. While their genomic data will not be merged with IRGSP's, it may still be accessed independently by rice scientists in resource-poor countries. It will be up to researchers to make sense of the three rice genome databases that now exist: IRGSP's, Monsanto's and Syngenta's."

Cantrell said that in fact he had come to admire Syngenta. He had been worried when he first heard that the inventors of 'golden rice', a rice genetically modified to produce vitamin A, to reduce vitamin A deficiency blindness - Ingo Potrykus of the Institute for Plant Sciences, Swiss Federal Institute of Technology (ETH), Zurich and Peter Beyer of the Centre for Applied Biosciences, University of Freiburg, Germany - had decided to involve the private sector in their quest to get this rice made available. "I thought, boy, that's going to really slow things down. At IRRI we had found that as we tried to deal with private companies, they didn't understand what we were trying to do. So I wasn't thrilled."

"But as the old story goes," Cantrell said, "I've come away with a different point of view. We've found Syngenta extremely helpful in trying to work out all of the intellectual property issues in negotiating with this golden rice technology; they clearly understood the need for new technology to address issues of poverty, and I thought they were really trying to be helpful." And as for Syngenta sequencing the genome "we're very optimistic about it" said Cantrell. "We're excited about the opportunity."

As for the great challenges, said Cantrell, "Obviously just producing enough food is always going to be number one. If we look at 1.4-1.5% annual increase in food production over the next 20 years [32-35% increase], that's a very daunting task in any respect. Number two is to develop a more completely nutritious product. We've got opportunities to address some of the micronutrient deficiencies such as iron and zinc and vitamin A, and we've evidence we'll be able to balance the amino acid content of rice, so it will be a more complete source of protein; so some of these things are very high priorities."

Rod Wing, however, is much less sanguine. "Anybody should be concerned. The concept of owning the most important food crop in the world raises serious ethical issues there that need to be addressed. I think it's inevitable that some genes, no matter what, will end up being patented. And my understanding is that Syngenta is going to try to patent every single thing they can."

"I had this thought yesterday - a dream - that a genome like rice should be considered a national park, where it's a resource for the world" said Wing. "In Asia, rice is like a religion, so to own a religion is impossible. We're going to press on as hard as we can to get rice into the public domain as soon as possible."

Takuji Sasaki, Director of the IRGSP and Director of Japan's Rice Genome Research Program is also cautious. "We must watch what happens with golden rice with much care," he told *BioMed central*. "We know that Syngenta is a private company. For them everything is business."

Guofan Hong, Director of the National Centre for Gene Research, China, who leads China's rice biotechnology programme, takes a middle view: "The most important thing in my view is to work out a reliable mechanism, whereby not only Syngenta gives their rice genome knowledge freely to the public but also the poorer countries are the major beneficiary, while their property rights are protected," he said.

At Syngenta, although they are reluctant to give more to the IRGSP, according to Dubock, international 'TRIPs' trading agreements have opened the door for them to give to the developing world. The Uruguay round of trade negotiations in the early 1990s led to Third World governments signing a set of rights relating to trade-related intellectual property, the 'TRIPs', and these have satisfied the company that it can give away technologies to certain countries - including the big rice growers China and India, and other Third World countries that have signed the TRIPs agreements - without risk to its rights.

For example, "Once a country has taken a decision about whether they want golden rice, and whether they judge it to be sufficiently safe and effective to be made available in their country, then the rice will be made available to these farmers at no charge for the technology, and farmers will be able to grow it, harvest it, consume the seed, plant the seed and grow it again, or engage in local trade," said Dubock.

"The local trade will help to lift the local people out of dependency." Sygenta "has a very long-term view," said Dubock. One day, when they are richer, these people could become markets for the company's products.

But what is Syngenta's current commercial interest in the rice genome, as most rice is grown by poor Third World farmers and only a tiny proportion (about 4%) is traded?

"Of course in terms of the commercial market, most of the value is in corn and wheat, rather than in rice," said Dubock. But "rice is a very good genetic map model for the other cereals."

Mike Gale, Head of the Comparative Genetics Unit at The John Innes Centre in Norwich, England agrees. "Rice shares the major genes with the other cereals." But Syngenta's work is not much use to scientists if it is not shared. "If it has as much impact as the Monsanto data it will have none, because the contractual arrangements to use it are too exacting."

The work's going to be very useful to Syngenta, however. "We expect to be able to use the information from the rice genome to map the other genomes as well," said Dubock "and if we can assign function to the genes we'll be able to do all sorts of things to improve the value and quality of the crops, either directly through breeding or through genetic manipulation; or indeed through knowledge of chemical targets for chemical inputs."

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