Notorious tree-killing fungus unravelled

To celebrate the final completion of the genome, the team held a Genome Jamboree. At the celebrations were from left to right: Dr Irene Barnes from the University of Pretoria, Prof Mark Yandel from the University of Utah, Mr Simon Martin and Prof Brenda Wingfield, both from UP.

Also attending the celebrations were from front to back, left to right: Prof Brenda Wingfield, Mmatshepho Phasha, Chrizelle Beukes, Kershney Naidoo, Dr Irene Barnes, René Sutherland, Simon Martin, Stefan Bam, Prof Emma Steenkamp, Gerda Fourie, Lieschen de Vos, Melissa Simpson, Oleg Reva Annie Chan, Magriet van der Nest, Albe van der Merwe, Prof Fanus Venter, Alisa Postma, Dr Martin Coetzee, Markus Wilken, Quentin Santana, Renate Zipfel, Stephanie Slinski from the University of Davis California, Prof Mark Yandel from the University of Utah and Darryl Heron.

The first multicellular genome to be sequenced in Africa was produced by scientists at the University of Pretoria. They produced the full genome sequence of the tree-killing fungus, *Fusarium circinatum*, renewing hope that the global destruction that it wreaks in commercial pine plantations may be stemmed in years to come.

The unfolding project encompasses fundamental DNA technology and has the potential to unlock practical applications for the South African forestry industry as well as intellectual property of global value.

Fusarium circinatum causes a destructive pine disease commonly known as pitch canker. It reduces growth and often kills trees. It originated in Central America and was accidentally introduced into many regions of the world where pine trees are planted as exotics, including countries such as South Africa, Chile, Spain, Japan, Korea and South Western USA.

Interestingly, the pitch canker pathogen was first observed in South Africa in 1990 where it was killing pine seedlings. It is now the most important impediment to pine production in the country, resulting in nursery or plantation establishment losses that can exceed 50%.

More recently, it has also emerged in mature pine stands in the Cape region where it has resulted in serious damage and is causing the stem disease for which the fungus is best known elsewhere in the world.

"Genetics of both the pathogen and tree are bound to play a major role in the arms race to stay ahead of this disease. A complete cure is unlikely, but control is probable. Continuous research may also provide more sophisticated tools for tree breeders seeking resistance to this devastating pathogen," says Brenda Wingfield, Professor of Genetics and Deputy Dean of UP's Faculty of Natural and Agricultural Sciences.

Prof Wingfield and a number of students started the sequencing study in 2008. The sequence was done by Inqaba Biotec, a South African genomics service company based in Sunnyside, Pretoria.

Prof Wingfield spent six months at the University of California in Davis in the United States of America (USA), studying and developing a deeper understanding as to what the genome can reveal about the fungus.

It is anticipated that the *Fusarium circinatum* genome will be one of many genomes annotated to UP in the future. The skills gained from this project will be used to pursue a higher level of academic and research training at UP.

"The larger vision of the project is to develop an annotation platform for genome sequencing and annotation in South Africa, and this will clearly promote biotechnology and education in the biological sciences in the future," Prof Wingfield concludes.The project is funded by the National Research Foundation (NRF) and the Department of Trade and Industry. The Oppenheimer Foundation, the NRF and UP supported Prof Wingfield to undertake her sabbatical research in the USA.