Sex explains rapid spread of resistance

Fungi reproduce both asexually and through sex. Sexual reproduction leads to a recombination, or crossover, of properties. Generally, the number of crossovers is limited. However, the fungus *Aspergillus fumigatus* has an average of 30 crossovers per chromosome, as a Wageningen study headed by Eveline Snelders shows.

The 30 crossovers are a genetic world record. To put it in perspective: in humans, crossovers occur three to four times per pair of chromosomes. The result of this large number of crossovers is that fungal sex leads to a complete makeover of the *Aspergillus fumigatus* genome. It's like cutting the deck of a pack of cards 30 times.
The sexual cycle of the *Aspergillus fumigatus* was only discovered in 2009, says Snelders. 'Sex explains the diversity we see in the fungus's genomes. That variation can't be explained by asexual (clonal) reproduction. But how does that diversity come about? Is it a question of not much sex and a lot of recombinations each time, or lots of sex with just a few recombinations each time?' Now we know it's the first option.

World record

Snelders and her team crossed two different fertile colonies of the *Aspergillus fumigatus* fungus and analysed the genetic composition of 195 offspring. After excluding other forms of recombination, they arrived at a new world record for the number of crossovers. The large number of recombinations has significant consequences for the development of resistance in the fungus.
Azoles have long been used to treat fungal infections, but *Aspergillus fumigatus* has developed resistance to them. The research by Snelders shows this resistance can develop after having sex just once because of the large number of crossovers. That means resistance can spread very rapidly in the case of this fungus. RK