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Genetic and agronomic approaches to reduce the acrylamide-forming potential of wheat

Acrylamide is a processing contaminant that forms from free asparagine and reducing sugars during high-temperature cooking and processing. It is a class 2a carcinogen (probably carcinogenic to humans) and its presence in a range of popular foods is a major problem for the food industry. Cereal and potato products, together with coffee, are the major contributors to dietary acrylamide. We aim to provide the knowledge, tools and resources to reduce the acrylamide-forming potential of wheat, working with colleagues at the John Innes Centre and a consortium of companies and organizations from the wheat supply chain. Free asparagine concentration is the limiting factor for acrylamide formation in wheat products. There are significant differences between varieties with respect to asparagine accumulation in the grain and the genetic control of this trait is being investigated and modelled. Environmental factors (E) also have significant effects on their own and in combination with varietal differences (G×E), and crop management is also important: Sulphur deficiency, for example, causes a massive accumulation of free asparagine in wheat grain and should be avoided. The study highlights the potential effects of abiotic stress and crop management on cereal grain composition and the implications has for nutritional and processing quality and food safety.

Biography

Nigel G Halford completed his Graduated from Liverpool University in 1983, Master's degree from University College London in 1984 and PhD from Rothamsted, UK in 1989. His research programme concerns "The genetics of metabolic regulation in crops, how plant metabolism is affected by stress and how it can be manipulated for crop improvement and improved food safety". He is a Fellow of the Royal Society of Biology, Visiting Professor at Shanghai Academy of Agricultural Sciences and Special Professor at the University of Nottingham.

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