



## Vacancy: PhD candidate in potato genetics

We are looking for a PhD candidate who is interested in helping to re-invent potato breeding using innovative biotechnology and genomics-based approaches.

Conventional potato breeding takes place at the tetraploid level, to exploit the yield advantage conferred by the naturally larger cells of tetraploids. Potato is normally an outbreeding crop that is intolerant to inbreeding and mostly self-incompatible (SI) at the diploid level. A recently proposed alternative, F1 hybrid breeding, is a paradigm shift in the genetic approach of breeding potatoes. The use of self-compatible (SC) and inbred-tolerant potato diploids allows the incremental accumulation of beneficial alleles via rapid backcrossing schemes. Diploid potato is a strict outbreeder due to gametophytic SI. Rare mutants lack this self-pollen arrest and are SC. In the end, highly inbred parental genotypes are hybridized to generate uniform F1 botanical seed as propagating material and any residual inbreeding depression is dealt with by exploiting the effect of heterosis. However, initiating F1 hybrid breeding in potato is an enormously expensive endeavour and out of the reach of many potato breeding companies.

We are developing Fixation - Restitution Breeding, an innovative potato breeding system where, somewhat different to F1 hybrid breeding, but likewise self-compatible diploids are used to accumulate favourable alleles via rapid backcrossing schemes. However, these lines are subsequently used to rapidly transfer and fix the traits into tetraploid breeding populations by virtue of the ability to produce unreduced diploid pollen, producing viable tetraploids when used in 4x X 2x crosses. Fixation-Restitution Breeding will also allow efficient recurrent selection to be harnessed in potato, but will be more feasible to implement than F1 hybrid breeding for most potato breeders.

Within the wider project, the candidate will work on a large panel of diploid potato genotypes, carrying out genome-wide association studies (GWAS) in order to identify allelic variation for traits important to the success of Fix-Res breeding. The candidate will pioneer the use of short read haplotypes and K-mer based approach recently developed at WUR (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6540404/>) to describe genetic variation in diploids and drive GWAS analysis. The project will also molecular marker-driven methods to monitor the extent of heterozygosity in inbred lines, and investigate the basis of the retention of regions of heterozygosity.

The candidate will join a consortium of research groups actively developing novel molecular, informatics and analytical approaches for genome-driven breeding in potato, allied to commercial potato breeding companies seeking to exploit these innovations.

The PhD project will be part of the ERA-NET project DIFFUGAT, involving 5 research partners and commercial potato breeding companies from the Netherlands, Ireland, Denmark and Germany.

## We ask

You are an ambitious and enthusiastic person devoted to science and eager to work on the interface of genomics and practical plant breeding. The following experience is required:

- Proven previous experience in a plant genetics, genomics, plant breeding or informatics research environment as evidenced by a significant academic project (preferably at the MSc level), or equivalent professional experience
- A high degree of proficiency in data analysis. Proven skills in handling large datasets is a preference.
- Excellent communication skills;
- Proficiency in English (spoken as well as written).

## We offer

This position is funded under the terms and conditions of the Teagasc Walsh Fellowship Scheme (<https://www.teagasc.ie/about/research--innovation/postgraduate-fellowships/>). You will be registered in the Graduate School of Experimental Plant Studies at Wageningen University, but based almost entirely at Teagasc Crops Research Centre in Carlow, in the Republic of Ireland, with training periods of several of up to several weeks per year spent at WUR. The position is for 4 years (subject to a satisfactory performance review in the first 12 months), and offers a tax free grant of €24,000 pa, covering fees and living expenses.

## More information

For more information about this position, please contact Dan Milbourne (Teagasc), Senior Research Scientist, Crop Science Department, Teagasc (Ireland), telephone number +353 9170291, E-mail: [dan.milbourne@teagasc.ie](mailto:dan.milbourne@teagasc.ie) or Herman van Eck, Assistant Professor, Plant Breeding, WUR (Netherlands), telephone number + 31 317 4828 37, E-mail: [herman.vaneck@wur.nl](mailto:herman.vaneck@wur.nl).

This vacancy is open until August 31st, 2019.

## We are

**Teagasc** – the Agriculture and Food Development Authority – is the national body providing integrated research, advisory and training services to the agriculture and food industry and rural communities in Ireland. One of six Teagasc research centres, The Department of Crop Science is located on a 225 hectare campus at Oak Park, Carlow. It is the home of the highly successful Teagasc potato breeding programme, and is equipped with facilities for state-of-the GPS guided sowing, drone-based plot phenotyping through to controlled temperature (glasshouse and chamber) growth facilities and fully equipped molecular, pathology and tissue culture laboratories. Our goal is to support the Irish tillage sector by delivering through to practise, science-led solutions that underpin both the profitability and environmental sustainability of Ireland's cropping systems. (see [www.teagasc.ie](http://www.teagasc.ie) ).

The mission Wageningen University & Research (WUR) is to explore the potential of nature to improve the quality of life. Within Wageningen University & Research, nine specialized research institutes from the Wageningen Research Foundation and Wageningen University have joined forces to help answer the most important questions in the domain of healthy food and living environment. With approximately 30 locations, 5,000 employees, and 10,000 students, it is one of the leading organizations in its domain worldwide. An integrated approach to problems and the cooperation between various disciplines are at the heart of the unique approach of Wageningen.