**Hyper-recombinant faba bean for accelerated breeding**

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Meiotic recombination is a critical process in plant reproduction which enables the creation of novel combinations of natural genetic variation. In plant breeding the rate of recombination is a limiting factor in genetic gain, and is required for many reasons, including stacking of positive loci, purging of deleterious mutations and efficient introgression.

While efforts have been made to use biotechnology to increase the rate of recombination in models and some crops, little research has been done in legumes. Faba bean is an important legume crop, with growing interest due to its plant protein qualities and use in rotations and intercrops. However, faba bean improvement is hampered by its extremely large genome (2n=12, 13Gb), and limited genetic variation. Increased recombination could be used to accelerate the breeding of new varieties.

We aim to assess the potential benefits of mutations to increase recombination in breeding program. This will be achieved by simulation of breeding programs, comparing normal rates of recombination (according to genetic maps) with hypothetical elevated recombination rates, including 2x, 4x, 6x and 10x. Simulation of breeding programs will also include a range in multiple other parameters including phenotypic vs genomic selection, marker density, and heritability and locus number of a hypothetic trait.

Current preliminary data indicates that even a moderate (2x) increase in recombination results in a significant improvement to genetic gain in breeding programs of varied parameters.

This supports the need to investigate these genetic modifications in faba bean, by translation of Arabidopsis molecular work into this important crop.

*(maximum 250 words, but title, authors and affiliations are not included; figures or tables are not allowed)*

***References:***