Scientists unlock the code to breeding better peas

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An international team of researchers has discovered exactly how peas have evolved and revealed the traits breeders can leverage to make them even better. Credit: Murdoch University

Peas are a crucial crop for Australian farmers due to their versatility and reliable yields across a range of environments and soil types. A source of protein, starch, fiber and minerals, peas are also a valuable rotation crop due to their ability to improve the soil that they grow in without using

industrial fertilizers.

This makes understanding their genetic makeup a priority, with research now unveiling high-quality reference genomes to understand crop domestication and accelerate genetic improvement.

"In the past decades, next-generation sequencing technology has greatly facilitated crop genomics studies, leading to a better understanding of genome architecture," explained Professor Rajeev Varshney, who is one of the project leaders.

"We have applied this technology to map the genetic structure and variations of 118 cultivated and wild pea genotypes."

Just as humans differ one to another, the differences in plants are also encoded in their genetics. This research, published in *Nature Genetics*, details the genetic structure and variance of peas and how they have evolved to this point in time and lays the groundwork for improving crops.

Plant breeders can use this information to develop new pea varieties with improved characteristics, like drought and frost tolerance. Genomic selection facilitates the rapid combination of superior genes and accelerates the breeding cycle.

"This study provides a deeper understanding of peas and the genes that can play a role in adaptation to climate change and help in developing more climate resilient crops," said Professor Varshney. "It fills the gap between previous basic models and modern genomics to boost research and crop improvement for the pea."

The research continues Professor Varshney and the Food Futures Institute's significant contribution to improving food security by

developing genetically optimized crops for different environmental conditions.

"This latest research highlights our genomics expertise and commitment to supporting international agriculture, in addition to contributing to agriculture right here in Western Australia," said Interim Vice Chancellor Research and Innovation, Professor Peter Davies.

The Food Futures Institute works to provide solutions on the sustainable use of limited land and water resources to economically and ethically improve food, forestry and fiber production.

This research supports United Nations Sustainable Development Goals 1 and 2, to eliminate poverty and hunger around the world.

More information: Tao Yang et al, Improved pea reference genome and pan-genome highlight genomic features and evolutionary characteristics, *Nature Genetics* (2022). DOI: 10.1038/s41588-022-01172-2

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