

# Progress toward the perfect pea

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Claire Domoney

A group at the John Innes Centre has developed peas that will help animals absorb more protein from their diet. The study is published in *PLOS ONE* today.

Pea and other legume seeds contain several proteins that stop [nutrients](#)

being absorbed fully in the [intestines](#). One such class of molecule is the [protease inhibitors](#). These slow down the rate at which humans, poultry or livestock digest proteins by incapacitating the enzymes that break them down. Previous nutritional studies with [broiler chickens](#) have shown that peas with proteins which disrupt digestion can reduce protein availability by up to 10%.

Dr Claire Domoney's group has identified and studied peas with mutations in genes coding for the seed protease inhibitors, known as the trypsin/chymotrypsin inhibitors. They found three types of mutation, one of which was in a wild relative of pea, and which completely wiped out the seed's ability to inhibit protein digestion. The other two mutations were generated by mutagenesis and were also effective in reducing the inhibitors, although less dramatically so.

Peas provide a valuable and nutritious crop for human and pet food and animal feed. Dr Domoney's results provide proof of principle for the ways in which food and feedstuffs can be improved through large-scale genetic approaches. The research can be extended to more proteins in pea and other legume crops, where food or feed use may be limited by the same or different seed proteins. Removal of allergenic proteins, for example, is an important goal for improving many food and feed crops.

Dr Claire Domoney said: 'The discovery of a wild pea line, a *Pisum elatius* line from Turkey which lacks a protein defined as an 'anti-nutrient', is a clear example of the value of diverse germplasm collections. Being able to generate and/or discover genetic variation for traits of interest to growers is essential for improving crop traits. In our case, the wild pea mutant has been crossed readily with the cultivated species, *Pisum sativum*, providing a headstart for breeders. Mutagenised resources, such as that at INRA, are also an invaluable resource for novel variation. We are now in a good position with new technologies to be able to screen very large numbers of lines for small changes in genes of

interest.'

Breeders, including Limagrain and Wherry & Sons, are already showing interest in the new peas. As non-GM methods were used, Dr Domoney expects widespread adoption of the variant [pea](#) lines and that the novel peas could reach the market within five years.

Mr Peter Smith, Arable Crops Director at Wherry & Sons Ltd, said: 'The value of genetics and targeted research in pulse crops aids the UK industry in achieving specific needs. The removal of inhibitors in peas is an example of one of many traits which should enable the industry to move forward with a nutritionally improved crop benefiting throughout the food chain. As pulses potentially become grown on a wider scale in the UK we must remain focused on producing a better product in comparison to imported pulses and protein crops.'

**More information:** "Eliminating Anti-Nutritional Plant Food Proteins: The Case of Seed Protease Inhibitors in Pea." *PLOS* Published: August 12, 2015 [DOI: 10.1371/journal.pone.0134634](https://doi.org/10.1371/journal.pone.0134634)

Provided by John Innes Centre

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