**Mutations in the *AFB4/5* auxin receptor gene confer altered shoot architecture and improved grain yield in field pea (*Pisum sativum*)**

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Hormonal regulation of plant architecture is a fundamental component of how plants respond to their environment to optimise resource capture and ensure their survival in the face of biotic and abiotic stress. We recently identified a series of herbicide tolerant field pea (*Pisum* sativum) lines with mutations in an auxin receptor, AUXIN SIGNALLING F-BOX PROTEIN 4/5 (AFB4/5). Alongside offering new weed management options, the mutants had unusual plant growth and development phenotypes. Substantial phenotypic variation was observed for shoot architecture, seed size, and phenology between different *afb4/5* alleles. *AFB4/5* played a role in seed size determination and grain yield potential. While null mutants were severely dwarfed, hyper-branched, and exhibited reduced seed size and yield, a unique hypomorphic mutant had a moderate effect on plant architecture and increased seed size and yield. Field trials in South demonstrated 27.5% increase in grain yield in a long-season, high-rainfall environment, and no yield penalty in a short-season, low-medium rainfall environment.

There is clear opportunity to target genes in hormone signalling pathways to develop a new crop ideotype for field pea and potentially other species to provide a step change in grain yield potential.