

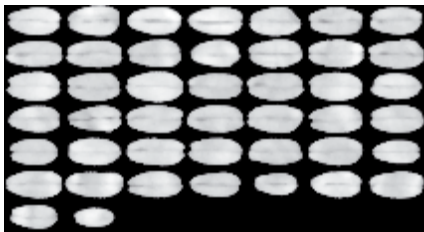
X-Ray CT Scanner

The new X-Ray Computed Tomography (CT) scanner provides advanced phenotyping technology to look inside the plant, head (spike) and seed. It offers researchers a high-throughput, automated and non-destructive phenotyping system which maximises efficiency for both pre-breeders working on trait discovery and breeders looking to assess breeding lines.

X-RAY CT SCANNER

Capability highlights

- An X-Ray CT scanner designed for plant research
- High-throughput, non-destructive phenotyping
- Automated process from scan to result
- 3D spike architecture
- Allows researchers to scan spikes to obtain knowledge on grain number, grain weight, density, volume and grain traits



Benefits of the X-Ray CT Scanner

- Users are able to capture images in high-throughput of the inside of plant structures, seed heads and grains
- Allows researchers to identify the effects of genetic differences across multiple breeding lines
- Assists in the discovery of traits associated with improved tolerance to stresses such as frost, heat and drought
- Reduces the time it takes to identify genetic improvements

What it can scan?

- Grain heads or spikes of wheat, barley, oats and sorghum
- Note: Other plant types (e.g. horticultural products) and root scanning are currently being trialled

About

The X-Ray CT scanner, which is located at The Plant Accelerator® in Adelaide, can be used by researchers to identify physical plant traits that contribute to stress tolerance, crop resilience and yield stability. The technology will benefit researchers who want to phenotype large numbers of samples in a non-destructive manner and help them gain insights into the effects of genetic differences across multiple breeding lines.

The X-Ray CT scanner was custom-built, with the Australian Plant Phenomics Facility (APPF) team working closely with the Fraunhofer Institute for Integrated Circuits from Germany and Dutch company PhenoKey.

The concept for the X-Ray CT scanner is based on human medical CT scanning, which provides cross sectional or three-dimensional x-ray images of human subjects to help with specialist diagnosis. The plant scanner has been modified to allow plant spikes to be carried to the scanner on a conveyor belt and then rotated in front of the CT scanner, rather than having the scanner rotate around the subject as is often the case in medical CT scanners. This means phenotyping can be done in an automated, high-throughput fashion that achieves maximum efficiency for both pre-

Technical specifications

- Sample size: up to ~900*200*200 mm
- X-ray energy: up to 220kV
- Detector: Flat panel detector
- Filter: 0.5mm copper
- Acquisition/scan time: ~7 minutes per sample cassette (holds 30 spikes)
- Can scan samples up to 90 cm tall

breeders working on trait discovery and breeders looking to assess breeding lines.

The scanner is suited to wheat, barley and oats with the potential to extend to other cereal crops and is beneficial for assessing the effects of drought, heat or frost and other relevant traits.

The X-Ray CT scanner was acquired by The Plant Accelerator®, the Adelaide node of the APPF. The purchase was made with investment from the Grains Research and Development Corporation. Co-investors include the University of Adelaide, APPF, the University of South Australia, the University of Melbourne, Macquarie University and La Trobe University.

Support

Researchers are invited to contact the APPF team directly for a quote on X-Ray CT scanner services. Simply drop off or post your samples to us (following our preparation guide) and we can assist through:

- Technical and lab support
- Sample preparation
- Scanning and experimental design
- 3D analysis of the samples
- Data analysis and interpretation (provision of report on the traits of interest)

Discover more: plantphenomics.org.au

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