

Seeing rice with X-rays may improve crop yields

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Most people experience X-ray computed tomography (CT) scanners when they are evaluated for a suspected tumor or blood clot. But in the lab of Dr. Quin Liu, PhD., in Wuhan China, rice plants were the patients in a novel use of CT scanners as part of an agriculture study to increase rice yield.

Into the [CT scanner](#) on a [conveyor belt](#) went little potted [rice](#) plants in an automated facility that could process 4,320 [rice plants](#) a day. The non-invasive CT energy analyzed tissues and matched their traits against a computer program to aid rice breeders in selecting plants with the best rice tillers. Tillers are specialized grain-bearing shoots of the plant that determine grain yield—and therefore are crucial to crop success.

Given that an estimated 3 billion people around the globe depend on one of the many species of rice for survival, demand pressure is high on rice breeders to maximize yield. Constructing large-scale, high-throughput automated industrial rice growing facilities helps. But one aspect of rice farming—tillering—is still done by hand. It is therefore vulnerable to human error that can undermine the success of a crop.

"In rice breeding, it is imperative that the traits of the tillers that result from hybridization or mutation are monitored and analyzed accurately," Dr. Liu explains. "This is true because with modern crop breeding methods using genetically modified organisms, it is possible to produce hundreds of new varieties daily. We need efficient techniques for screening the best plant material possible. Automating tillering by CT

provided higher throughput, higher measurement accuracy and lower cost than other technologies previously used to measure the tillers on rice plants."

In the study, Dr. Liu collaborated with Wanneng Yang, Xiochun Xu, Lingfeng Duan, Qingming Luo, Shangbin Chen and Shaoqun Zeng at the Britton Chance Center for Biomedical Photonics, Wuhan National Laboratory for Optoelectronics-Huazhong University of Science and Technology.

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