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X-ray micro computed tomography for whole maize characterisation

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Micro-structure of whole maize kernels were characterised using X-ray micro computed tomography (μ CT). Kernels, differing in hardness, germinated for 0 h, 10 h and 22 h, followed by freeze drying, were scanned for 25 min. Results were depicted as two dimensional 2D slice images obtained from three dimensional (3D) volumes. Difference in endosperm texture of the 0 h kernels could be observed in the 2D slice images due to differences in endosperm density. Two types of endosperm (typical of a maize kernel) could be clearly identified. Floury endosperm is low in density and the vitreous endosperm is high in density. Attenuation differences were caused by a decrease in X-ray energy as it interacts with the vitreous endosperm. High attenuation indicated high density material (vitreous endosperm) and low attenuation indicated low density material (floury endosperm) or voids. Comparing 0h, 10 h and 22 h kernels the process of germination could be visualised. The onset and development of the germination process could clearly be seen as voids in the peripheral area of the kernel as well as between the germ and endosperm area. Pores in the germ of the 10 h and 22 h germination kernels confirmed that germination had taken place. Loss of endosperm integrity was also observed as decreased attenuation. X-ray micro computed tomography, if the speed of analysis can be decreased even more, can be a useful non-invasive method to determine endosperm integrity.

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Yes

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