



Development of an Efficient **Approach** to **Dehulling Canola** Seeds on Industrial Scale

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Outline

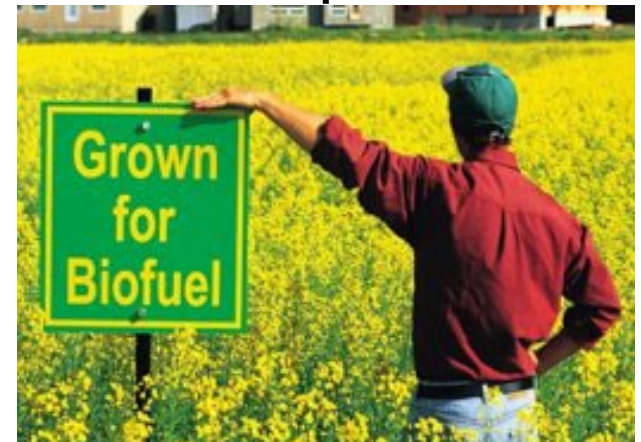
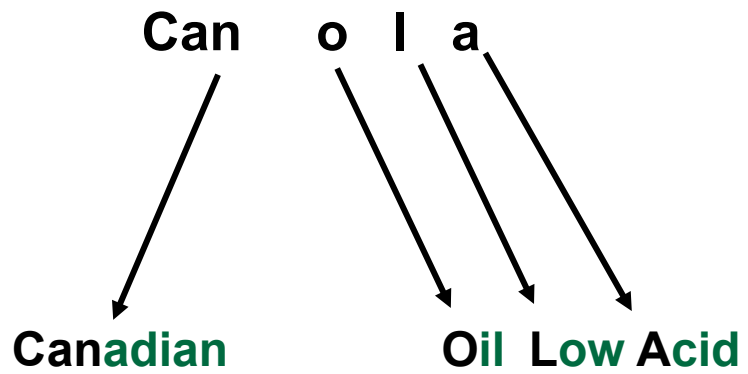
1. Introduction
2. Preconditioning process
3. Dehulling process
4. Summary



<https://www.albertafarmexpress.ca/news/bin-busting-canola-yields-come-to-alberta/>

1. Introduction

- What is Canola?



1. Introduction

- Seed Processing

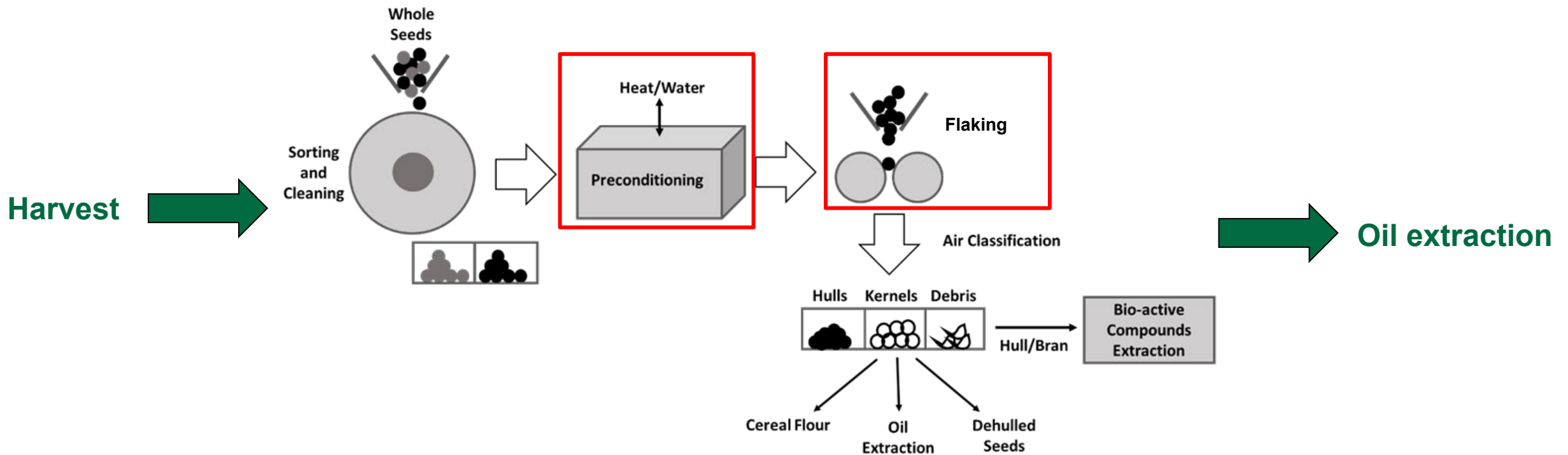


Fig.1 Flow diagram of the typical processing of seed from cereal, pulse, and oilseed crops (Martinez-Soberanes et al., 2020).

1. Introduction

- New Technology



Fig. 2 Picture results of flaked canola (Carré et al., 2016).

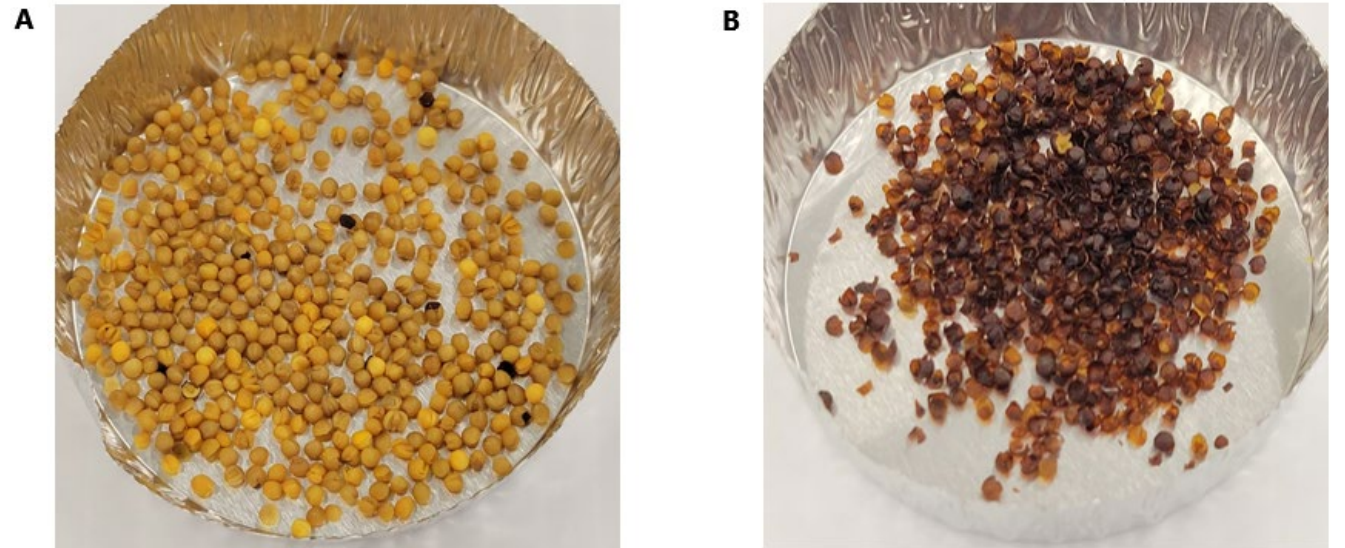


Fig. 3 Fractions obtained from the dehulling canola seed. (A) Dehulled sound kernel and (B) hulls (Martinez-Soberanes, 2023).

1. Introduction

Characteristic of canola seeds:

- Small and uneven size (1.5-2mm)
- Spherical alike shape
- Thin hull (~35um)
- Low mechanical load
- The tight association of the hull and kernel

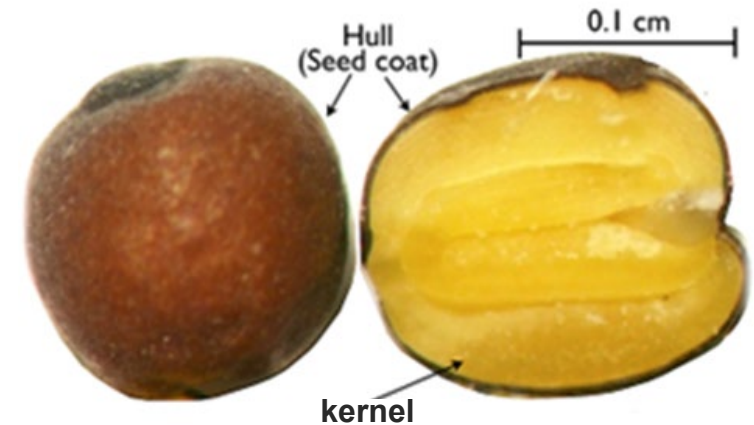


Fig.4 Picture of a canola seed.

Preconditioning process - disconnect the association between the kernel and hull;

Dehulling process - mechanical method to remove the hull from the seed.

2. Preconditioning Process

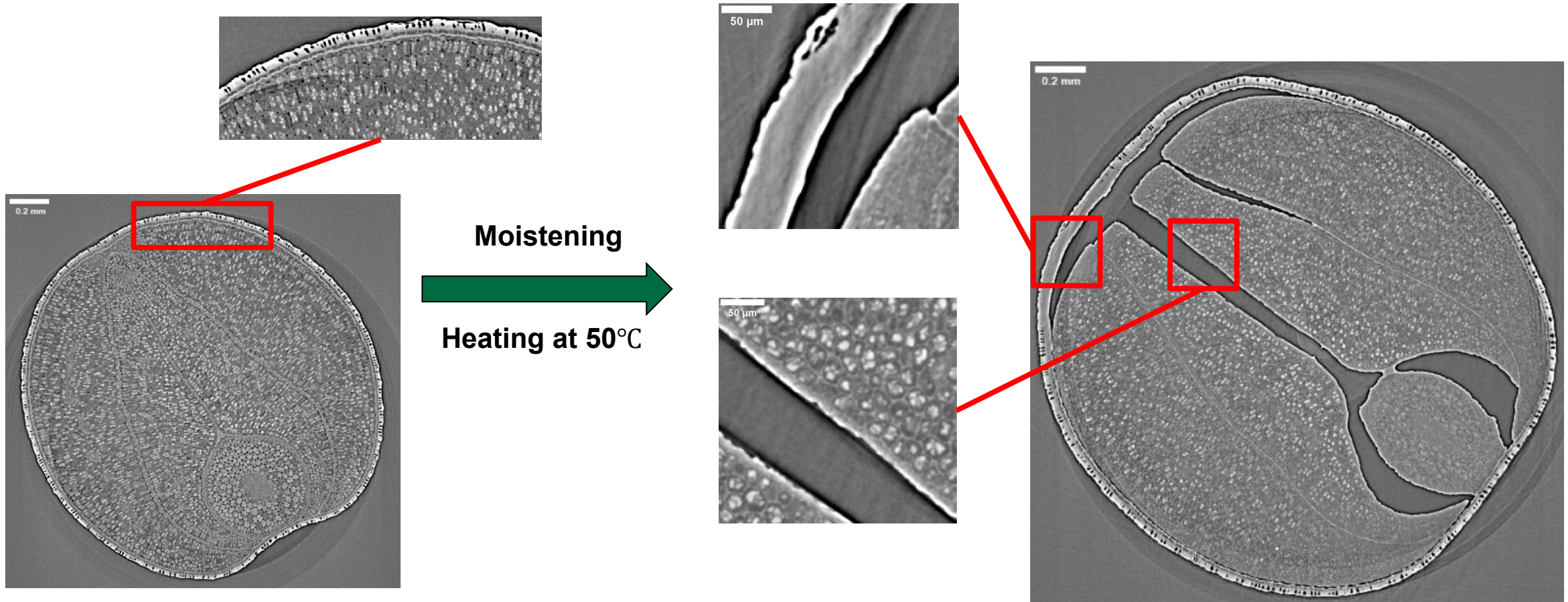


Fig.5 Raw canola seed.

Fig.6 Thermal treated canola seed.

3. Dehulling Process

- The Finite Element Method (FEM)

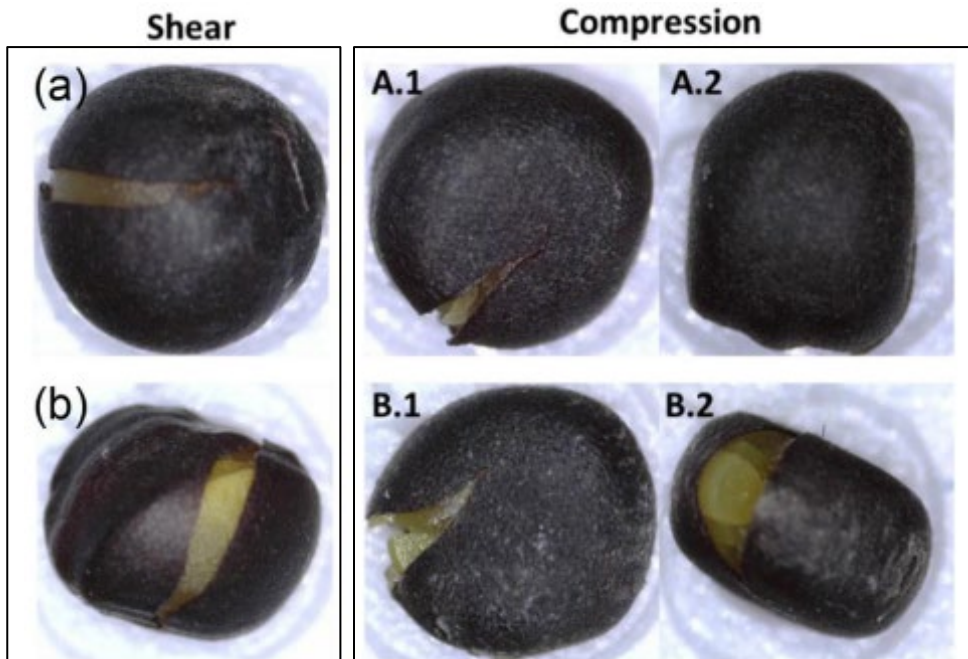


Fig. 7 Comparison of seeds after shear and compression stress tests (Martinez-Soberanes et al., 2023).

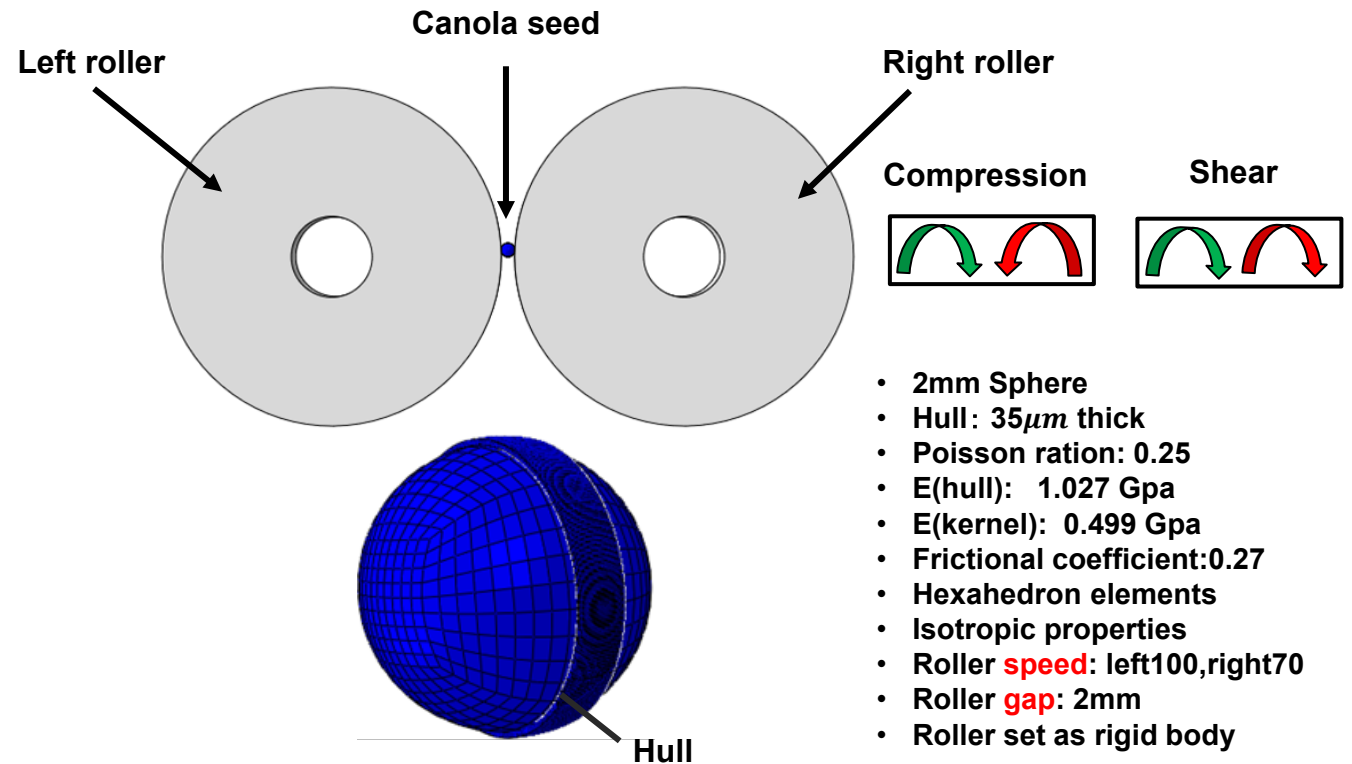


Fig.8 The 3D finite element model of the roller machine and canola seed.

3. Dehulling Process

• 2D Compression model

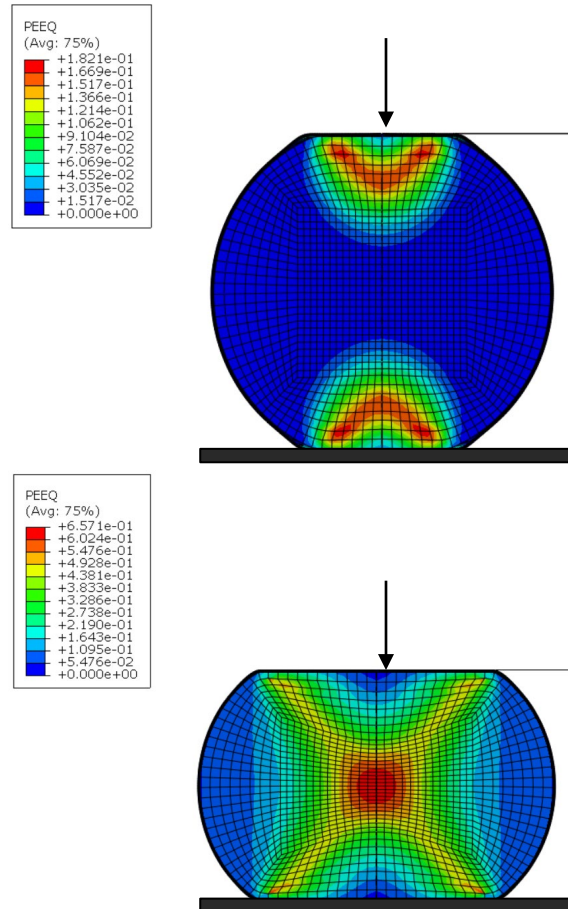


Fig. 9 The 2D compression model.

• 3D Compression and Shear model

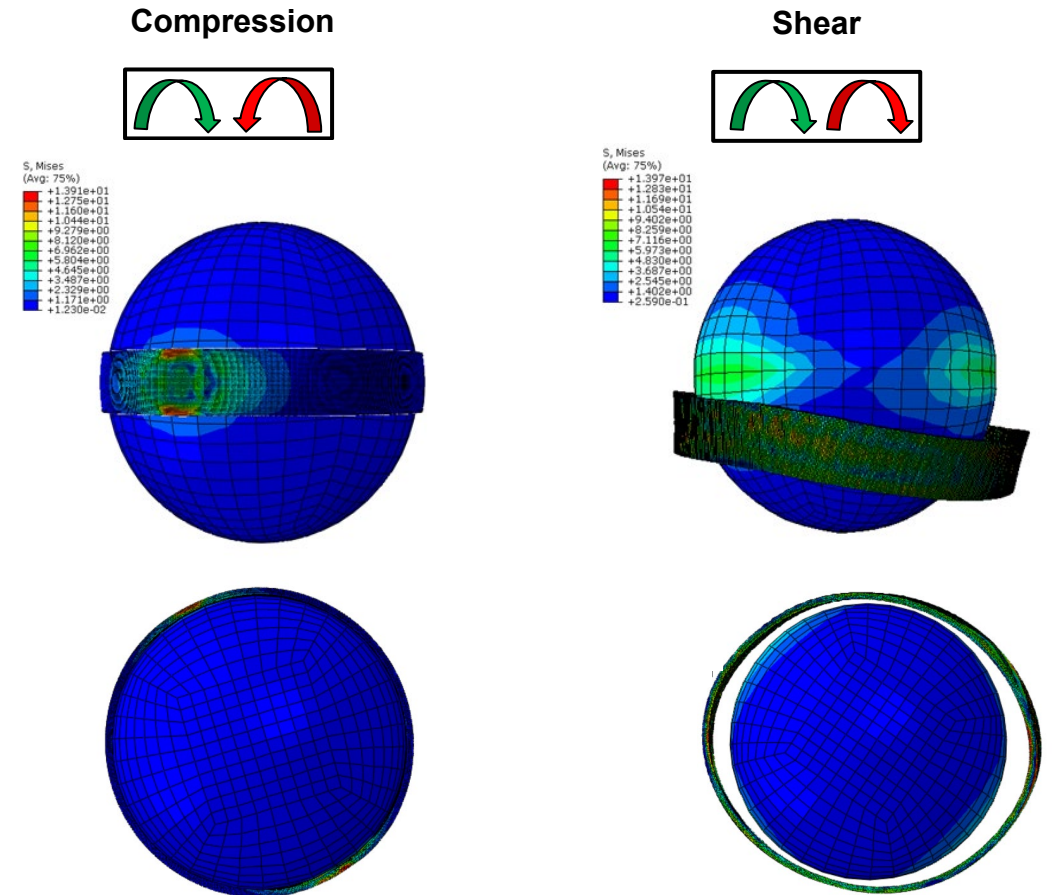
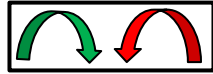


Fig. 10 The 3D compression model.

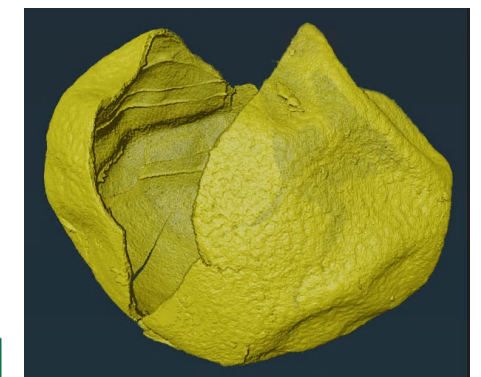
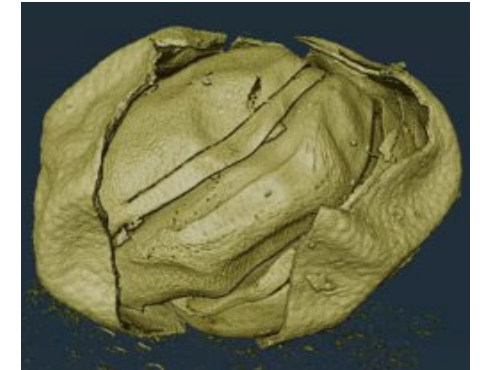
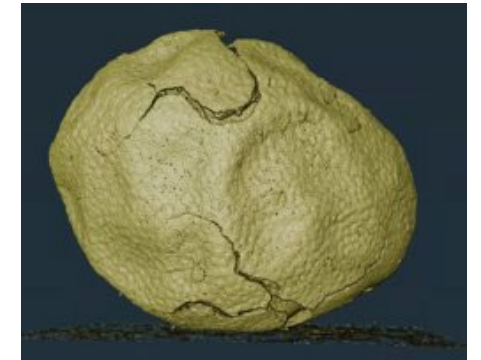
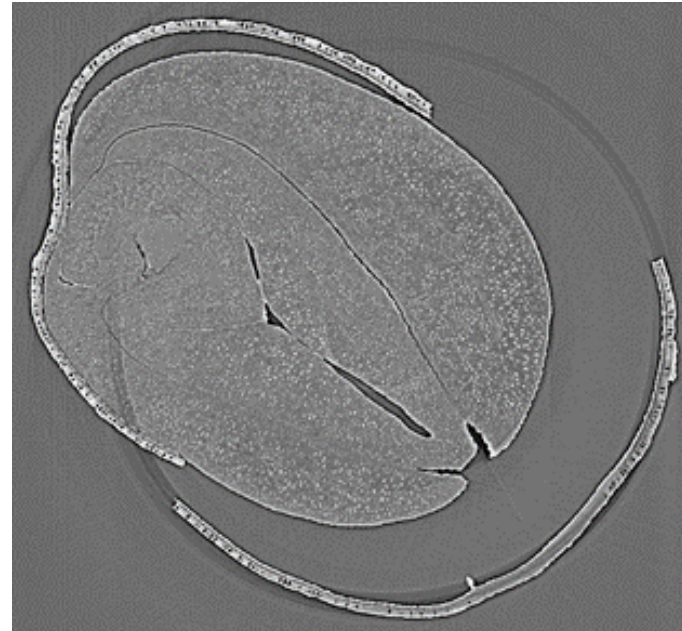
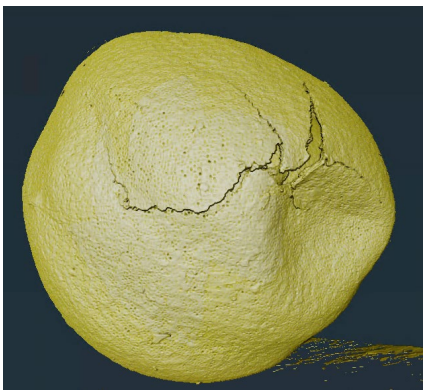
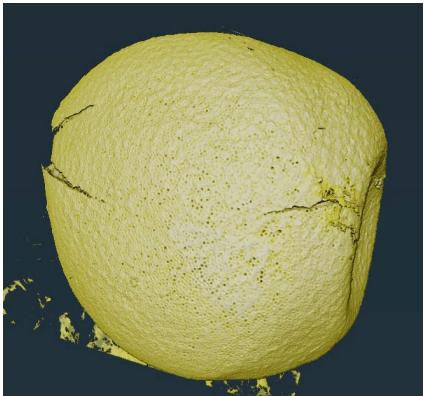
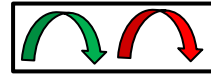
3. Dehulling Process

- Synchrotron-based X-raying images

Compression



Shear



4. Summary

- **Preconditioning: 1) air gap to facilitate the dehulling;
2) increase the oil yield.**
- **The shear force should dominate the dehulling process over compression.**

Thank you!