SusOrgPlus – Practice Abstract

Smart drying of organic food products

Problem

While the organic production on the farm is regulated in detail, there is no clear definition on processing of organic food products. Drying of food is an energy intensive processing and can be inefficient resulting in high energy demands and poor final product quality.

Solution

Smart drying offers a huge potential to individualize drying processes related to the product and changes inside the product during processing. Drying parameters and product are monitored and used to control the drying process continuously.

Applicability box

Theme

Organic processing

Keywords

Drying, smart control, monitoring, sustainable processing

Equipment

Sensors to measure drying parameters and product surface temperature/ moisture loss

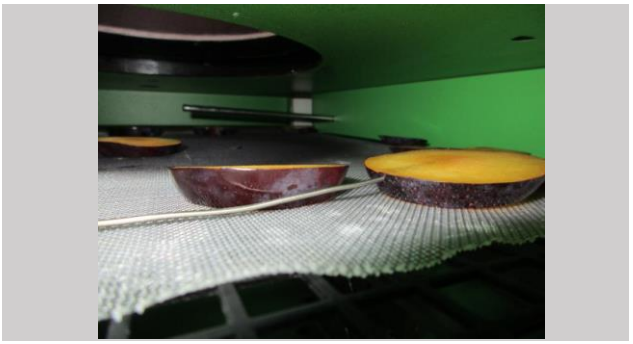
Impact

Smart drying applications enable sustainable processing of organic food in terms of high final product quality and efficient drying processes. Valuable compounds are maintained to a higher degree compared to conventional drying applications.

Practical recommendation

- **Know the critical temperature(s) of product components and decide which is the maximum allowed temperature for each product.**
  - ✓ **Avoid the product temperature to exceed critical temperatures of product compounds.**
- **Monitor the moisture loss and the product surface temperature (pyrometer, infra red camera) and be aware that air temperature ≠ product temperature.**
  - ✓ **Higher temperatures at the beginning of the drying process until the sharp rise of the product temperature flattens (inflexion point)**
  - ✓ **Constant temperatures until the final moisture content is reached**
- **Control air temperature, velocity and relative humidity related to the drying phase of the product.**
  - ✓ **High velocities at high evaporation rates**
  - ✓ **Avoid case hardening and shrinkage**
- **Develop drying strategies in terms of drying parameters related to your drying device and the specific products based on experimental determined time intervals (s.a.).**

Decreased drying times at increased product quality and increased energy efficiency!



Picture 1 (left): Measurement of product temperature during drying of plums.
Picture 2 (right): Low color change of dried apples related to optimized drying processes.
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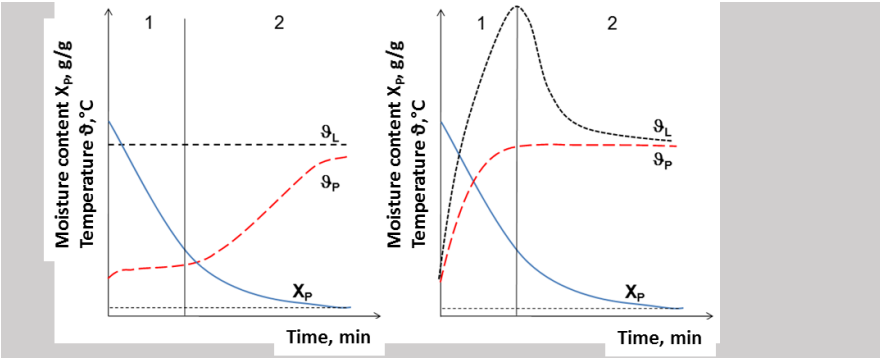

Figure 1: Description Temperature development during air temperature and product temperature-controlled drying (Sturm, 2010)[1].

Further information

Video

- Check the following video for further instructions [EN]: https://www.youtube.com/watch?v=2lkfvqbINB0

Further readings

- https://www.susorgplus.eu/downloads

Weblinks

- Check the Organic Farm Knowledge Platform for more practical recommendations.
- SusOrgPlus web page: https://www.susorgplus.eu/

About this practice abstract and SusOrgPlus

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[1] Sturm, B. (2010). Einfluss der Führung des Trocknungsprozesses auf den Trocknungsverlauf und die Produkteigenschaften empfindlicher biologischer Güter (Impact of process control on the drying kinetics and product characteristics of sensitive biological products). Forschungsbericht Agrartech-nik 491 des Arbeitskreises Forschung und Lehre der Max-Eyth-Gesellschaft Agrartechnik im VDI (VDI-MEG). (Doctoral Dissertation) (https://kobra.bibliothek.uni-kassel.de/bitstream/urn:nbn:de:hebis:34-2010102534814/3/DissertationBarbaraSturm.pdf).

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