

Microwave technology applied in post-harvest treatments of cereals and legumes

Annalisa Dalmoro¹ Anna Angela Barba¹, Silvestro Caputo², Francesco Marra³, Gaetano Lamberti³

¹*Dipartimento di Farmacia, DIFARMA, Università degli Studi di Salerno, via Giovanni Paolo II, 132, 84084 Fisciano (SA) Italy*

²*Consorzio per la Ricerca Applicata in Agricoltura, CRAA, Centro Direzionale Isola A/6, via G. Porzio 80143 Napoli Italy*

³*Dipartimento di Ingegneria Industriale, DIIn, Università degli Studi di Salerno, via Giovanni Paolo II, 132, 84084 Fisciano (SA) Italy*

Microwave heating processes are currently applied in many fields: from minerals treatments and environmental remediation processes: from food industry to pharmaceutical emerging technologies (Chandrasekaran et al., 2012). Reasons for this growing interest are due to the peculiar mechanism for energy transfer: during microwave heating, energy is delivered directly to materials through molecular interactions with electromagnetic field via conversion of electrical field energy into thermal energy. This can allow unique benefits, such as high efficiency of energy conversion and short processing times, thus reductions in manufacturing costs thanks to energy saving, and selective heating.

For agricultural purposes microwave heating is an emerging technology, today successfully applied in disinfestation post-harvest treatments of many agricultural products, such as rice and beans, susceptible of degradation due to the presence of natural infesting fauna (Yadav et al., 2012).

Aim of this study is to characterize, mainly in terms of physical properties, cereals and legumes, products to be processed by microwave irradiation cycles for drying and disinfesting purposes (post-harvest treatments). In particular, attention is focused on materials' thermo-physic properties (thermal conductivity, thermal diffusivity, dielectric properties, water content, granular mass properties etc.) due to their relevance on microwave irradiation protocols. Indeed, despite extensive researches and several applications of microwave heating in post-harvest treatments, a comprehensive study on the properties of heat transport in starchy and protein structures, with low moisture content, is still lacking. Overall goal of the research is to point out correlations between thermo-physic properties and irradiation conditions (power, time to exposure, load configuration) to stabilize cereals and legumes in short without damages of the nutrient contents.

References

- CHANDRASEKARAN, S., RAMANATHAN, S. & BASAK, T. 2012. Microwave material processing—a review. *AIChE Journal*.
- YADAV, D. N., ANAND, T., SHARMA, M. & GUPTA, R. 2012. Microwave technology for disinfestation of cereals and pulses: An overview. *Journal of Food Science and Technology*, 1-9.