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Corresponding Author	Family Name	**Dudarev**
	Particle	
	Given Name	**Igor**
	Prefix	
	Suffix	
	Role	
	Division	
	Organization	Lutsk National Technical University
	Address	75, Lvivska St., Lutsk, 43018, Ukraine
	Email	i_dudarev@ukr.net
	ORCID	http://orcid.org/0000-0002-2016-5342
Author	Family Name	**Moroz**
	Particle	
	Given Name	**Iryna**
	Prefix	
	Suffix	
	Role	
	Division	
	Organization	Lutsk National Technical University
	Address	75, Lvivska St., Lutsk, 43018, Ukraine
	Email	
	ORCID	http://orcid.org/0000-0001-9167-4876
Author	Family Name	**Zabrodotska**
	Particle	
	Given Name	**Lyudmyla**
	Prefix	
	Suffix	
	Role	
	Division	
	Organization	Lutsk National Technical University
	Address	75, Lvivska St., Lutsk, 43018, Ukraine
	Email	
	ORCID	http://orcid.org/0000-0002-9504-5767

Abstract — To optimise seed storage and processing methods – particularly aeration, drying, separation, and mixing – it is essential to consider the porosity of seed packing. Porosity significantly affects airflow resistance and

heat and mass transfer in bulk seed layers. It depends on multiple factors, including seed size and shape, fractional composition, compaction level, and moisture content. Additionally, the geometry and material of the container or equipment chamber holding the seeds influence porosity distribution and uniformity. A comprehensive approach is introduced, integrating mathematical modelling with experimental research to improve the accuracy of porosity determination in seed packing. This methodology enables the identification and validation of suitable models that reflect the physical properties of seeds and their spatial arrangement. Four packing models were developed and tested for wheat, barley, oats, rye, flax, pumpkin, and sunflower seeds. The models are based on unit cell structures where seed shapes are represented using idealised geometric forms: a prolate spheroid for wheat, barley, oat, and rye seeds, and an elliptical cylinder for flax, pumpkin, and sunflower seeds. Experimental studies were conducted to evaluate natural seed packing porosity and determine physical characteristics such as seed size, 1000-seed weight, and moisture content. A comparison of modelled porosity values with experimental data enabled the identification of the most accurate models for each crop type. The best-performing models showed deviations from measured porosity in the range of 0.4% to 11.2%, confirming their suitability for engineering applications in seed handling and processing.

Keywords (separated by '-')	Seed Modelling - Bulk Material Packing - Particle Packing Porosity