

**Title** Seed technology and seed enhancement  
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### **Abstract**

This review paper considers recent developments, trends and challenges, with particular emphasis on the array of ‘enhancements’ that can be implemented in commercial practice. These are the ‘functional seed treatments’ performed after conditioning to improve physical, physiological or pathological performance during storage and sowing and afterwards: their properties; the equipment, materials and techniques for their manufacture; their uses across crops, and biological response mechanisms to them. Coating technology - pelleting, encrusting and film coating – are used increasingly widely to facilitate seed planting, by altering seed shape, weight and surface texture, improving seed-soil contact, manipulating imbibitions, and delivering materials such as micronutrients and crop protection agents, including the high dose systemic insecticides that can impair germination. New manufacturing techniques are allowing more flexible ‘just-in-time’ production. Hydration treatments that manipulate vigour or physiological status such as by priming, steeping, and pregermination – to make germination and seedling growth more rapid and synchronous and better tolerate environmental stresses in the seedbed, both in the open field and under cover. Both priming and coating technologies can also deliver beneficial microorganisms to crops on seeds. Organic farming market standards are stimulating the evaluation and optimization of methods to produce healthy planting material and new seed sanitation treatments as alternatives to fungicides or conventional hot water treatment while retaining seed viability in storage, and acquisition of knowledge of the link between contamination and potential disease risk. Diagnostic techniques of physiological seed quality include computer image analysis systems, and metabolic tests for the non-intrusive measurement of respiratory metabolism. Some of these techniques offer the prospect of removing weak or dead seeds and hence ‘upgrade’ seed lots.