

# Chitosan and other edible coatings to extend shelf life, manage postharvest decay, and reduce loss and waste of fresh fruits and vegetables

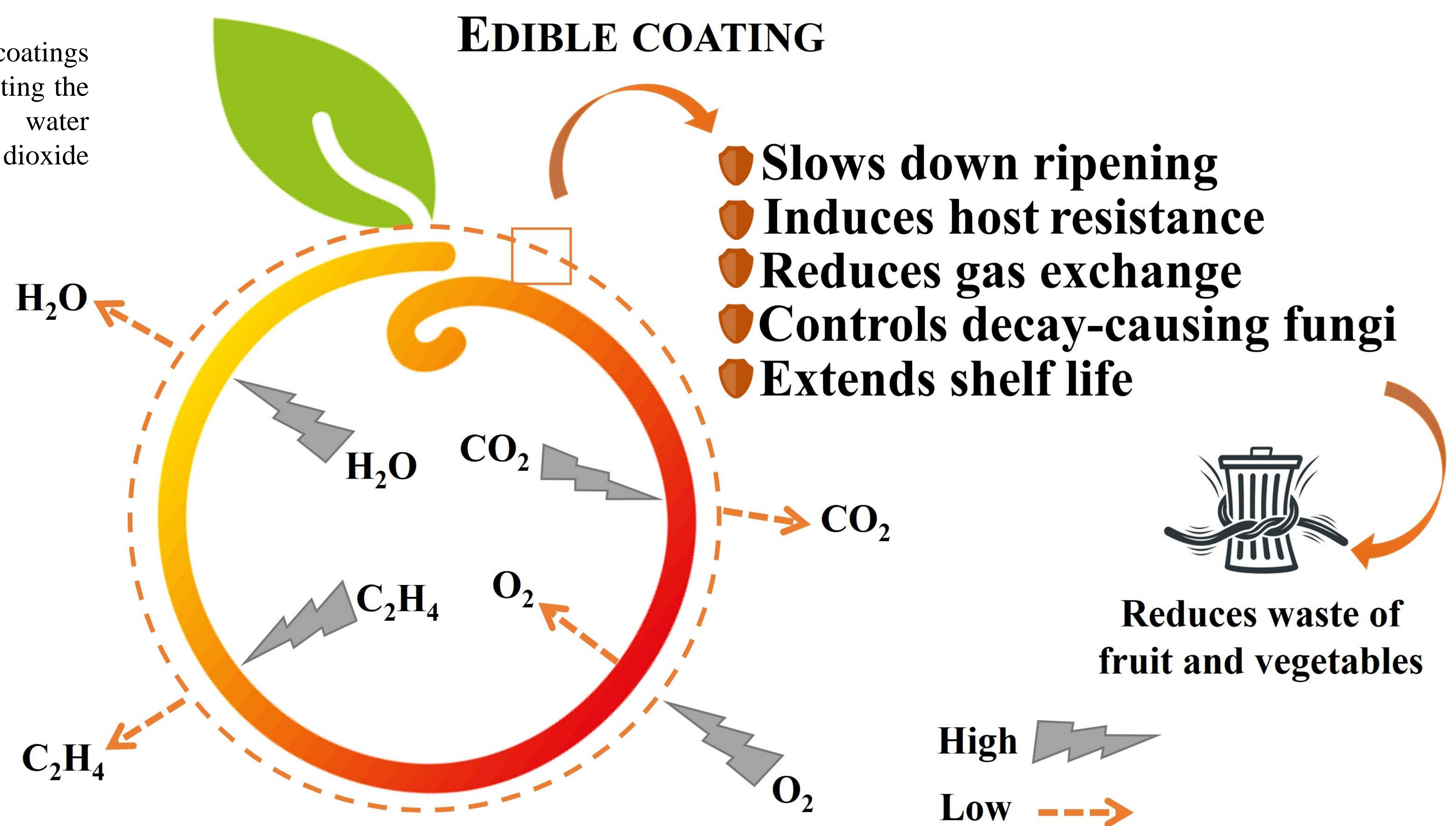
ROMANAZZI G.\*, MOUMNI M.

Marche Polytechnic University, Ancona, ITALY [g.romanazzi@univpm.it](mailto:g.romanazzi@univpm.it)

## Abstract

Fresh fruits and vegetables contain a high percentage of water and continue metabolic activity after being harvested, resulting in ripening, increased sensitivity to decay-causing fungi, and consequent loss and waste. Reducing fresh fruit and vegetable loss and waste can help decrease the pressure on food-production systems, particularly within the context of finite natural resources and climate change. Edible coatings are prepared from naturally occurring renewable sources and can contribute to reducing waste, respecting the environment, and consumer health. Chitosan and other edible coatings can have antimicrobial, film-forming and eliciting activities, that additively or synergistically prevent fungal decay, keep the quality, and reduce fresh product waste.

**Figure 1.** Main proprieties of edible coatings applied on fruits and vegetables, affecting the permeability to ethylene (C<sub>2</sub>H<sub>4</sub>), water (H<sub>2</sub>O), oxygen (O<sub>2</sub>), and carbon dioxide (CO<sub>2</sub>).



**Table 1.** Examples of chitosan-based commercial products that are available for the control of diseases of fresh fruits and vegetables (modified by Romanazzi et al. 2018).

Product trade name	Company (Country)	Formulation	Active ingredient (%)
Chito Plant	ChiPro GmbH (Bremen, Germany)	Powder	99.9
Chitosano	Agrilaete (Palmanova, UD, Italia)	Powder	100
Chitosano denso		Liquid	50
OII-YS <sup>1</sup>	Venture Innovations (Lafayette, LA, USA)	Liquid	5.8
KaitoSol	Advanced Green Nanotechnologies Sdn Bhd (Cambridge, United Kindom)	Liquid	12.5
Armour-Zen	Botry-Zen Limited (Dunedin, New Zealand)	Liquid	14.4
Biorend	Bioagro S.A.(Chile)	Liquid	1.25
Kiforce	Alba Milagro (Milano, Italy)	Liquid	6
FreshSeal	BASF Corporation (Mount Olive, NJ, USA)	Liquid	2.5
ChitoClear	Primex ehf (Siglufjordur, Iceland)	Powder	100
Bioshield	Seafresh (Bangkok, Thailand)	Powder	100
Biochikol 020 PC	Gumitex (Lowics, Poland)	Liquid	2
Kadozan	Lytone Enterprise, Inc. (Shanghai Branch, China)	Liquid	2
Kendal Cops	Valagro (Atessa, CH, Italy)	Liquid	4
Mastgrape	Enoceca (Vegrar, VR, Italy)	Liquid	5
Prevatect	Ascenza (Saronno, VA, Italy)	Liquid	5
Chitosano Serbios	Serbios (Badia Polesine, RO, Italy)	Liquid	5
Chitosano	Bioplanet Srl (Cesena, Italy)	Liquid	1.9
Chitosano DC	DAL CIN GILDO SPA (Concorezzo, MB, Italy)	Liquid	2
IBISCO <sup>2</sup>	GOWAN ITALIA s.r.l. (Faenza, RA, Italy)	Liquid	15

<sup>1</sup>Contains 6% yucca extract; <sup>2</sup>The formulation is based on an average of 12.5% of COS (chito-oligosaccharides)-OGA (oligo-galacturonides), with a chitosan concentration of 1.5%

## ACKNOWLEDGMENTS

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## REFERENCE

Romanazzi, G., and Moumni, M., 2022. Chitosan and other edible coatings to extend shelf life, manage postharvest decay, and reduce loss and waste of fresh fruits and vegetables. *Current Opinion in Biotechnology*, 78. <https://doi.org/10.1016/j.copbio.2022.102834>