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## Clove essential oil and nanoclays-based active food packaging

Kalpani Y. Perera

*Technological University Dublin, d19129125@mytudublin.ie*

Shubham Sharma

*Technological University Dublin*

Amit K. Jaiswal

*Technological University Dublin*

*See next page for additional authors*

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Funder: Technological University Dublin

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**Authors**

Kalpani Y. Perera, Shubham Sharma, Amit K. Jaiswal, and Swarna Jaiswal

## Clove essential oil and nanoclays-based active food packaging

Kalpani Y. Perera<sup>1,2</sup>, Shubham Sharma<sup>1,2</sup>, Amit K. Jaiswal<sup>1,2</sup> and Swarna Jaiswal<sup>1,2</sup>

<sup>1</sup>*School of Food Science and Environmental Health, Technological University Dublin;* <sup>2</sup>*Environmental Sustainability and Health Institute, Technological University Dublin*

Active food packaging materials enhance the shelf-life of food products while reducing food waste. The current study aims to develop a biodegradable active food packaging material. The food packaging material was developed with the incorporation of clove essential oil, sodium alginate, gelatin, and nanoclay films were prepared. The influences of nanoclay and clove on the surface, optical, mechanical, chemical, barrier, and pH-indicating properties were studied. The lightness and yellowness increased by 1.06 folds and 3.34 folds when compared to clove (control), respectively. The UV barrier property  $0.08 \pm 0.01 \text{ nm}$  in all films, while 8.37 folds reduction in transparency has been observed as compared to clove films. The tensile strength was reduced by 62.25% while elongation at break increased by 2.23 folds when compared to NC (control) film. The surface roughness increased with the addition of NC. The hydrophobicity of the films has increased up to 85.64. Water vapour permeability increased by 8.25% and oxygen permeability increased by 67.61%. Complete *E. coli* and *S. aureus* inhibition at 24 hours in all films containing clove. Thus, the developed packaging film can be used as an active food packaging material that enhances food shelf-life.

## Exposure assessment of Dicyandiamide through milk

A. Ray<sup>1</sup>, P. Forrestal<sup>2</sup>, C. Nkwonta<sup>3</sup>, N. Rahman<sup>2</sup>, P. Byrne<sup>4</sup>, M. Danaher<sup>3</sup>, K. Richards<sup>2</sup>, S. Hogan<sup>4</sup> and E. Cummins<sup>1</sup>

<sup>1</sup>*School of Biosystems and Food Engineering, University College Dublin;* <sup>2</sup>*Teagasc, Johnstown Castle, Wexford;* <sup>3</sup>*Teagasc Research Centre, Dublin 15;* <sup>4</sup>*Moorepark Research Centre, Cork*

Dicyandiamide (DCD) is a nitrification inhibitor that effectively reduces nitrogen losses from fertilizer applied to pastures and has the potential to reduce Greenhouse Gas Emissions. Due to high DCD application rates (10 kg/ha) used in New Zealand, residues were found in their dairy products which raised food safety concerns. The objective of the paper was to carry out an exposure assessment of DCD through milk to address these concerns. A probabilistic risk assessment methodology was employed to characterize risk to humans following DCD's application to Irish agricultural soil. An exposure model was created in Microsoft excel using the @risk add-on to quantify residues in milk and calculate daily intake of DCD from milk by humans. The predicted mean DCD concentration in milk was 0.003 mg DCD/kg milk for the granular and 0.009 mg DCD/kg milk for the liquid application methods, respectively, while the daily intakes of DCD for both granular and liquid methods were  $8 \times 10^{-6} \text{ mg}$  and  $2 \times 10^{-5} \text{ mg DCD/kg body weight/day}$ , respectively. The results generated by the study were below the European Food Safety Authority set DCD Tolerable Daily Intake limit of 1 mg DCD/kg body weight/day, indicating that DCD does not present a significant risk to human health.

## Antibacterial Marinades can control Pathogen Proliferation in Chicken meat

Marmion M.<sup>1,3</sup>, Rauniyar P.<sup>1</sup> and Scannell A.G.M.<sup>1,2,3</sup>

<sup>1</sup>*UCD School of Agriculture and Food Science Dublin;* <sup>2</sup>*UCD Institute of Food and Health, Dublin;*

<sup>3</sup>*UCD Centre for Food Safety, Belfield, Dublin 4*

Poultry meat is popular among consumers. During poultry processing, cross-contamination with microbiome-associated pathogens is commonly observed, posing a risk to vulnerable consumers if not suitably prepared. However, interventions intended to reduce this risk may not appeal to consumers, who prefer minimal, natural processing. Citrus juices and essential oils are natural ingredients which have antimicrobial effects against bacteria. This study explored the incorporation of these ingredients into effective and appealing combinations in order to minimise the risk of illness from chicken. Three marinades were prepared using optimised concentrations of essential oils; thyme oil in lemon juice with pepper (M1), lemongrass oil in lime juice with chili (M2), and oregano, basil and garlic in olive oil (M3). Chicken was inoculated with  $10^6 \text{ CFU/g}$  *Salmonella enterica*, *Listeria innocua* or *Campylobacter*