HIGHTECH EUROPE

Natural antimicrobial additives in cereal products.

Natural antimicrobials for cereal

Identification

Key words	antimicrobial, cereal, additive, natural, carvacrol, acetic acid, lactic acid, calcium lactate
Latest version	2011/07/26
Completed by	FRIP

How does it work?

Primary objective	Using natural compounds for microbial stabilization of cereal products which will be more acceptable for consumers than preserved by synthetic compounds.
Working principle	The natural compounds occurring in common foodstuffs (like spice...) are expected to have less or no bad influence on the human organism. Using different natural compounds (extracted from plants e.g. cinnamaldehyde, cinnamic acid, eugenol, perillaldehyde, thymol, and carvacrol and its precursor p-cymene; microorganisms; animals...) and combinations thereof for stabilisation, it is possible to reduce microbial growth and at the same time decrease the impact on human health. Many different compounds and mixtures have potential to be used for conservation, but they need to be tested for the effective dose [1,2,3,4,5,6]. For example: carvacrol – Carvacrol is a monoterpenoid, natural occurred in Origanum vulgare. It was tested against four microorganisms in single culture and coculture. All strains were completely inactivated within 24 h [5]. organic acid – organic acid (acetic acid, lactic acid) and their salts (calcium lactate, lactate-containing cocktail, calcium propionate) were tested against Bacillus strains causing bread spoilage.
Images	
Additional effects	Can change sensory properties (acidification, spice extracts...). Increase of consumer acceptance expected because of natural origin and flavour increase.The essential oils should be selected appropriately for different types of food to avoid undesirable flavors.
Important process parameters	Temperature.
Important product parameters	The natural antimicrobial agent should be chosen with regard to the food properties (pH, reactivity...) and the consecutive treatment (especially heating).

What can it be used for?

Products	Different types of antimicrobials can be used for different products. It depends on its stability and sensory properties.
Operations	Chemical stabilizing without use of synthetic compounds.
Solutions for short comings	Need for natural antimicrobial additives for cereal products.

What can it NOT be used for?

Products	Depends on each compound. May react with some other components (both examples given here can react with bases; carvacrol moreover with oxidizing agents).
Operations	Depends on each compound. Maybe thermolabile, pH instable. The listed compounds are relatively stable (Carvacrol - flash point 106 °C).
Other limitations	Volatile compounds like carvacrol or acetic acid can evaporate during processing and storing.
Risks or hazards	The compounds have natural origin and occur in foodstuff. They are on the GRAS list (generally recognized as safe). Just take attention on possible dose limit for daily intake. The organic acids mentioned are corrosive and caustic if concentrated.

Implementation

Maturity	Carvacrol and organic acids are used in industrial scale. Many compounds are tested and prepared in lab scale.
Modularity /Implementation	This replaces just commonly used antimicrobials. The consecutive steps in the processing line have to consider the stability and reactivity of the newly added ingredient. These compounds or extracts should be tested in real foods under expected conditions of use and of potential abuse.
Consumer aspects	The use of natural compound instead of synthetic is expected to be well accepted.
Legal aspects	The compounds can have concentration or dose limits for human daily intake. Please check local legislation. (Regulation (EC) No 1331/2008 of the European Parliament and of the Council of 16 December 2008 establishing a common authorisation procedure for food additives, food enzymes and food flavourings)
Environmental aspects	No

Facilities that might be interesting for you

Title	**Institute/company**
Auditorium IRTA	IRTA
Clean room – Histocell	Noray
Video observation system for market research and product development tasks - Keki	NAIK EKI

Further Information

Institutes

University of Jaén, University of the Witwatersrand - MCB, University College Dublin - AgFoodVet, South Dakota State University - ABE, DIT - FSEH, CZU - AF

Companies

References

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