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COST Action FP1405

Active and intelligent fibre-based packaging – innovation and market introduction

Label as detector of bacteria - what future in smart packaging?

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cost

EUROPEAN COOPERATION
IN SCIENCE AND TECHNOLOGY
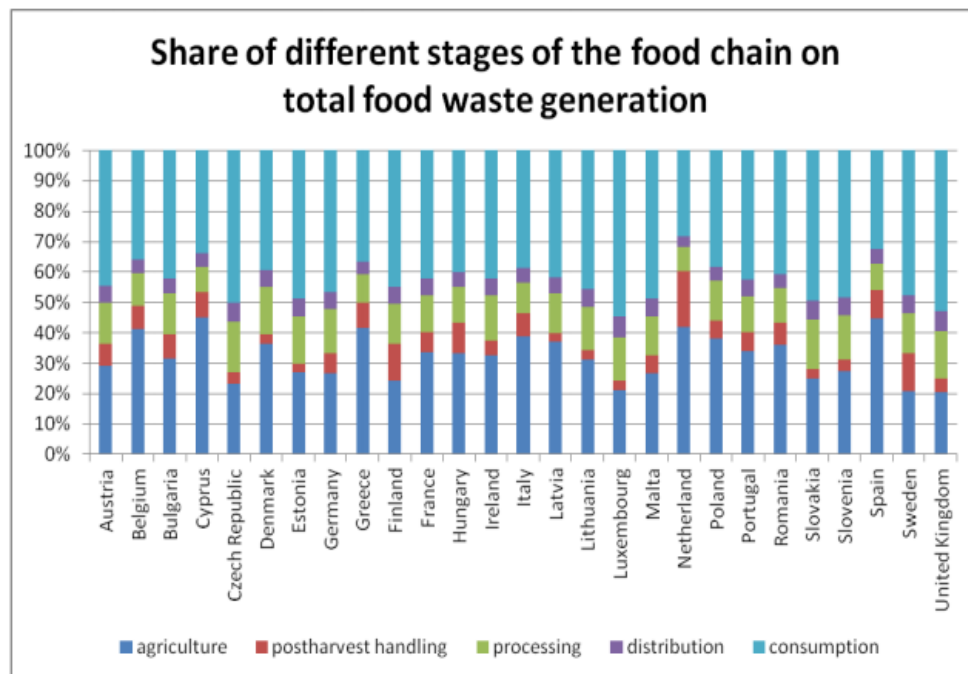
COST is supported by
the EU Framework Programme
Horizon 2020

Introduction

Can we introduce label as detector of bacteria in the actual market ?

Goals of these labels :

- Inform the consumer
- Reduce food vast
- Reduce epidemic risks

Graphique 1: Proportion des différentes étapes de la chaîne alimentaire dans la production de déchets alimentaires dans les 27 pays de l'Union (calculs ITAS)

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I. BACTERIA   DETECTION

1. Traditional ways

We distinguish 3 ways :

- Methods based on crops and counts of bacteria

- Methods based on DNA (ex : PCR)

- Methods based on immunology (ex : ELISA)

➢ Not expensive ways, but need lot of time to quantify.

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2. Bacteria detected

Bacteria	Products or risk area	Infectious dose (digested bacteria)	Incubation period
Listeria	•Unpasteurised milk •Crude meat and fish	< 1000	2 days to 3 weeks
Campylobacter	•Poultry and cattle bowels	400-500	2 to 5 days
Escherichia Coli	•Rare meat •Derivatives from raw milk •Apple juice, cider	< 10	2 to 4 days
Salmonella	•Milk and derivatives •Raw eggs •Seafood	15-20	12 to 24 hours
Bacilus cereus	•Non refrigerated food before cooking	-	1 to 24 hours
Clostridium	•Canteens storing hot food	-	-

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II. SMART PACKAGING AND TTI

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1. Definition of smart packaging and TTI
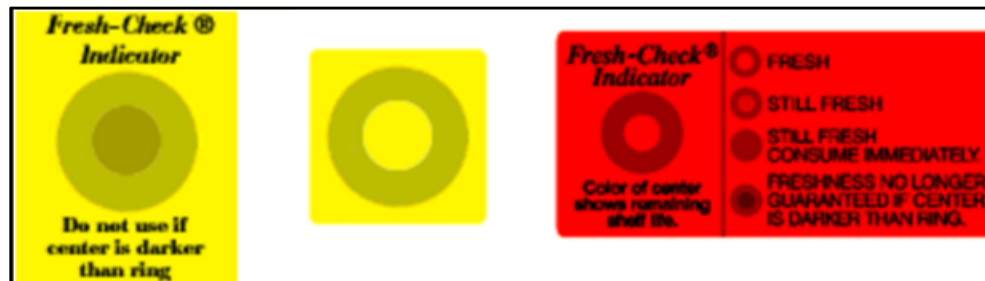
Smart packaging is able to :

- Watch the product

- Inform the consumer about the quality of the content

It contains a sensor/ indicator which react with environmental changes.

For example : Time-temperature indicators >> cold chain monitoring

2. Different types of TTI

- Thermochromics inks indicators

- Indicators based on micro-organisms

- Fruits maturity indicators

III. TTI MARKET

1. Main actors in the TTI market

In France :
- UMR IATE INRA Montpellier / Nathalie Gontard,
- Minalogic Grenoble pole, and associated structures
- Plastipolis Oyonnax pole, and associated structures
- Industrial actors like Cryolog/Traceo

In Europe :
- Freshpoint and Bizerba in Switzerland,
- Timestrip in United-Kingdom.

This market is 95 % Business to Business.

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2. Problems to solve

Coupling with limit date of consumption>> two indications which can be contradictory.
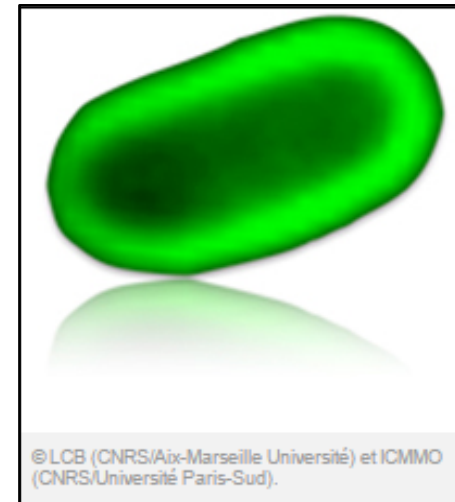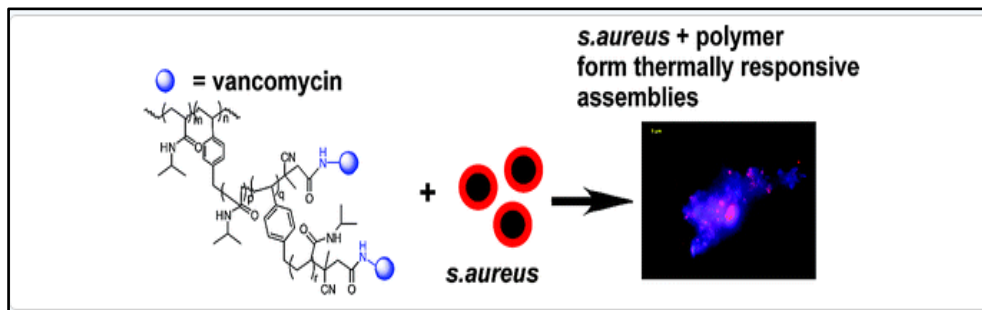
Example of commercialisation in France:

- Monoprix : TTI on fresh products

- Picard : freshness chip on frozen food

- Carrefour : milk board bottles

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IV. LABEL AS DETECTOR OF BACTERIA

1. Direct detection of bacteria

Different technics :

- Coupling of an antibiotic with a fluorescent agent

- Coupling of a sugar with a fluorescent agent

Escherichia coli mark by modified KDO sugar and fluorescent agent
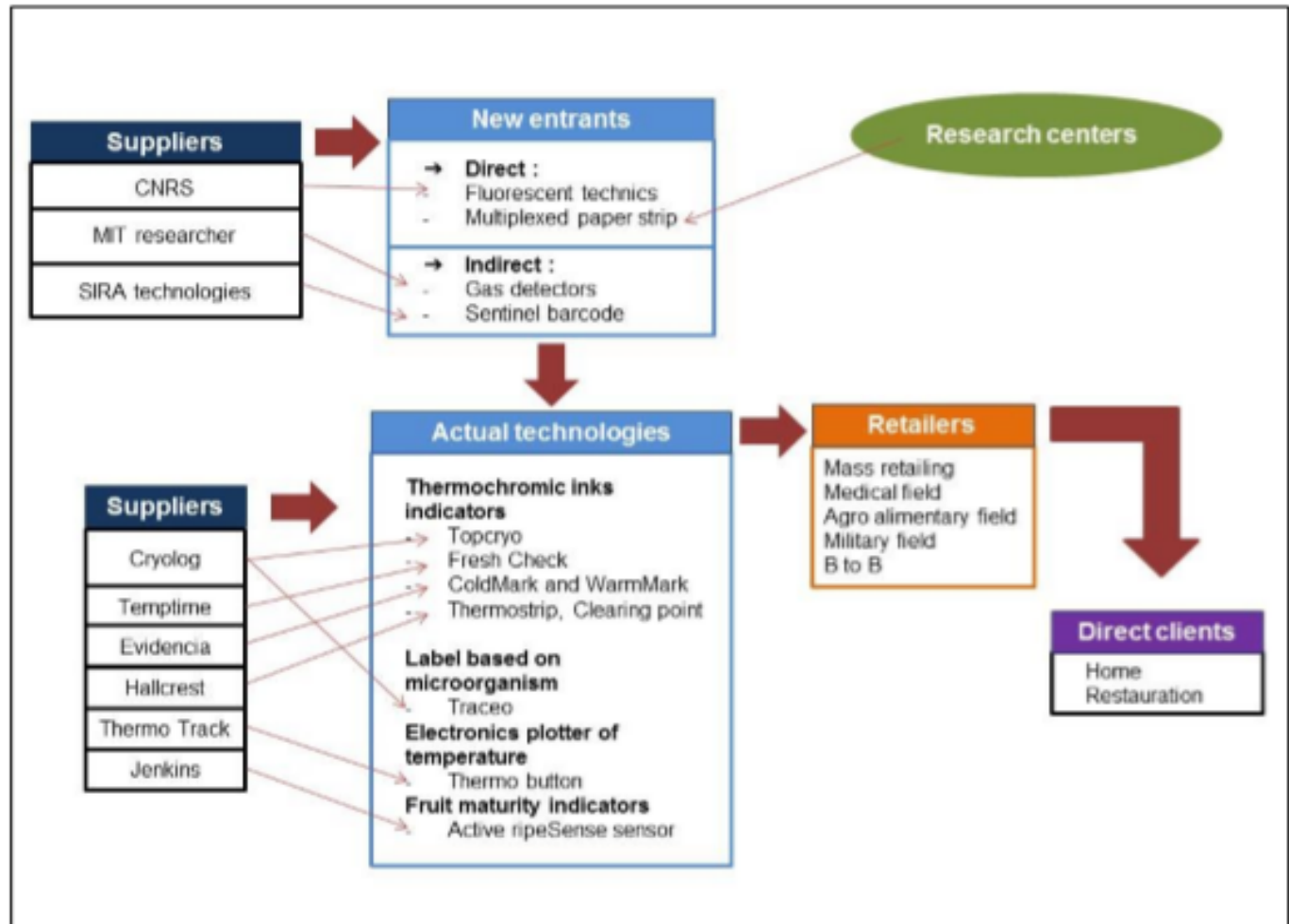
2. Indirect detection of bacteria

Different technologies :

- Detecting of gas emitted by bacteria : putrescine and cadaverine or rotten fish smell

- Barcode created by SIRA technology

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V. MARKET OF THESE LABELS

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1.Porter diagramm

2. SWOT matrix

Strength	Weakness
- Speed of the analyse - Specificity of the detection - Detectable by the consumer	- Unrecyclable - Cost - Depending on the type could be not compatible with sanitary regulations
Opportunity	**Threat**
- Growth of the packaging sector which leads to a growth of labels sector - Demographic growth - Laws which imposes to have a quick detection - Epidemic risks increasing	- TTI - Low cost of the TTI - Laboratory analysis becoming faster and still low cost - Wholesale increasing

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Conclusion

Summary :

➢ Growth of the packaging market

➢ Sanitary regulations are becoming more stringent

➢ Food waste is an important issue to solve

Different perspectives :

- End of packaging

- DLC replaced by label detector of bacteria

- Too high cost of fabrication >> small market

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Thank you for your attention