New microbiological culture to control foodborne pathogens in fresh-cut fruit

Areas: Biotechnology, Food

Collaboration Opportunity: Available to license.
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Summary: A research at the University of Lleida has developed a new microorganism with demonstrated biopreservative activity. The strain CPA-7 of *Pseudomonas graminis* is capable of **inhibiting the growth of foodborne human pathogens** suchs as *Salmonella*, *Listeria monocytogenes* and *Escherichia coli O157:H7* in fresh-cut fruit.

The proposed technology prevents the development of main food-borne human pathogens, **ensures food safety and maintains the product quality** throughout the product shelf-life by means of an user-friendly method.

This solution is a **complementary strategy to existing chemical** methods and results in a more profitable preservation method from both environmental and economical point of view, while it does not requires large additional investments.

Need: The daily net fruit and vegetable consumption in the EU increased 5,6% in 2013 compared with 2012. In order to facilitate the daily intake of fruit & vegetables (F&V), the "fresh-cut" sector plays an important role, and may help meet the objective of consuming the recommended daily intake of vitamins, minerals and fiber, due to fresh-cut F&V convenience and freshness.

Nowadays, **the consumption of fresh-cut fruit is increasing throughout Europe and USA**. Although these products undergo minimal processing, the risk of contamination by human pathogenic bacteria may be increased during industrial and commercial handling. Disinfection by means of chemical methods and/or good manufacturing practices does not assure the complete elimination.

Market: U.S. fresh-cut produce represents an estimated $27 billion market (2015) and sales are annually increasing. In the retail segment, fresh-cut fruit represents a 12% and 72.4% of products are delivered without any preservative.

The total EU fruit and vegetable production is 120 million tons, of which 70 million tons are used fresh. Of the 70 million tons fresh production, fresh fruit production accounts for 36 million.

The total European trade of fresh fruit and vegetables is increasing gradually year by year. The United Kingdom confirms to be the Europe's leader in the fresh-cut market sales, followed by Italy (FAO, 2010), with a retail market growth in the three years 2008-2010 of 6% in average (Nielsen, 2010). In countries like Germany and Spain, in which fresh-cut fruit & vegetables (F&V) is still emerging, the market growth in the last years was higher than other countries in which this market is already established, for instance Italy and the Netherlands.

Commercial Applications: Its use in the fruit industry, particularly in minimally processed fruit, prevents the development of food-borne pathogens, ensures food safety and maintains the product quality by means of an easy-friendly method. In addition, it could be useful for the same application in other ready-to-eat food produces.

Competitive Advantages:

- ✓ Ensuring **microbiological safety** while **preserving product quality** (appearance, flavour, texture) both at room and cooling conditions (from 5ºC to 20ºC).
- ✓ **Maintenance of product shelf-life**, particularly if the chill chain is broken.
- ✓ Microorganisms **do not show ability to survive in gastrointestinal conditions** (*in vitro* tested)
- ✓ **Demonstrated effectiveness** for *Salmonella spp.*, *Listeria monocytogenes* and *Escherichia coli O157:H7* in fresh-cut fruit.
- ✓ Microorganisms **characterized *in vitro*** to develop future quality controls.
- ✓ **Compatible with current manufacturing technology** in the fresh cut fruit industry.

Funding received: several public national funding for research

Development status: pre-commercial validation

Intellectual Property:

1. US Patent granted (US 8,735,136)
2. European patent granted (EP2886665)