

Assessment and validation of alternative disinfection systems to sodium hypochlorite in pre-prepared food industries

Summary

The growing demand from consumers for safe and convenient foods with high nutritional value has in recent years led to an increase in the consumption of foods that are pre-prepared, ready to consume and cook, and which retain their nutritional properties and freshness. There is no stage in the processing of these products that ensures that the microorganisms present are completely eliminated, and the disinfection stage is the only one in which microbiological contamination can be reduced to ensure their safety. The most widely used disinfectant is currently chlorine, in the form of sodium hypochlorite. The effectiveness of chlorine on plant matter is limited to 1-2 logarithmic reductions, even at high doses. It is also highly reactive, reacting quickly with organic matter, air and light. For this reason, water is usually hyperchlorinated (at between 50 and 200 ppm), which can produce chlorine gas in facilities and in contact with organic matter, and lead to the production of excessive amounts of undesirable and potentially toxic by-products (mainly trihalogenated compounds). It has been banned in some EU countries as a result. Other alternatives to sodium hypochlorite have recently been investigated, including ozone, chlorine dioxide and peracetic acid, among others.

The aim of this project is to establish an alternative disinfection procedure that ensures consumer safety, maintains quality, extends the life of the product and is more environmentally friendly.

Objectives

1. Description of the current disinfection process in the beneficiary industry.
2. Study the effect of temperature (difference in temperature between product and water) on the effectiveness of the disinfectant.
3. Evaluate the effectiveness of disinfectants or alternative technologies, and study how organic matter affects its effectiveness on a leafy vegetable and a fruit under laboratory conditions.
4. Validation of the selected system in a pilot plant. Effect on product quality.
5. Implementation and validation of the new system in industry. Determination of the product's shelf life.
6. Preparation of a protocol of general measures.

Description of the measures planned in the project

ACTION 1. Description of the current disinfection process, by preparing a questionnaire and visits during the product preparation process.

ACTION 2. Study the effect of temperature (difference in temperature between product and water) on the effectiveness of the disinfectant. **ACTION 3.** Assess the effectiveness of disinfectants or alternative technologies taking into account the values of organic matter obtained in action 1, to simulate real conditions.

ACTION 4. Validation of laboratory results in the pilot plant.

ACTION 5. Implementation and validation of the new system in industry.

ACTION 6. Preparation of a protocol of general measures.

Expected results and practical recommendations

- Obtain data on the effectiveness of the hypochlorite treatment currently carried out.
- Obtain the range of parameters to be studied under laboratory conditions.
- Ascertain the effect of temperature on the internalisation of foodborne pathogens in sliced vegetable products.
- Obtain the optimum temperature range (product - water) for the disinfection process.
- Obtain an alternative system to sodium hypochlorite for disinfecting pre-prepared fruits and vegetables, and validate it under pilot plant conditions, ascertaining its effects on microbiological, physicochemical and sensory quality.
- Determine the shelf life of the disinfected product using the alternative system in a pilot plant.
- Effectiveness of the selected treatment at the industrial level and cost-benefit assessment.
- Have an industry-specific disinfection protocol.
- Improve the quality and food safety of products (reduce microbiological contamination and chlorine-derived compounds) and extend their shelf life.
- Technical and economic viability of the alternative disinfection system to sodium hypochlorite.
- Have a general disinfection protocol, available to the public.

Leader of the Operational Group

ORGANISATION: AMETLLER ORIGEN OBRADORS, SL

CONTACT E-MAIL: aprat@casaametller.net

Coordinator of the Operational Group

ORGANISATION:

CONTACT E-MAIL:

Other members of the Operational Group (not recipients of the grant)

ORGANISATION: IRTA

CONTACT E-MAIL: isabel.abadias@irta.cat

Subject area(s) of application

- Agricultural production system
- Agricultural practice
- Agricultural equipment and machinery
- Livestock farming and animal welfare
- Vegetable production and horticulture
- Landscape / Territorial management
- Pest and disease control
- Fertilisation and nutrient management
- Soil management
- Genetic resources
- Forestry
- Water management
- Climate and Climate Change
- Energy management
- Waste and by-product management
- Biodiversity and environmental management
- Food quality/processing and nutrition
- Supply chain, marketing and consumption
- Competitiveness and agricultural and forestry diversification
- General

Geographical area(s) of application

PROVINCE(S)	REGION(S)
ALL OVER CATALONIA	ALL

Dissemination of the project (publications, seminars, multimedia, etc.)

The communication and dissemination plan for the project and its results will be carried out on two levels – the first with the companies taking part in the project, and the second with a series of actions open to the general public. In addition, the profile of the project will be raised through the IRTA dissemination system, and through the channels of the companies in the Operational Group.

At a company level, at the end of the project, the results obtained will be made available to the technical staff involved in the production of pre-prepared foods. In addition, action 5 includes the drafting of a disinfection procedure that will be made available to all company staff.

With regard to dissemination outside the Operational Group, a general public disinfection protocol will be drafted at the end of the project. Together with the results obtained, it will be disseminated in the specialisation seminar entitled 'Processing pre-prepared and pre-cooked fruit and vegetable products.' This is an annual seminar lasting three days, organised by the Tàrrrega School of Agricultural Training, which is held at the Fruitcentre, with the participation of IRTA researchers.

In addition, there will be a specific technical seminar on disinfecting pre-prepared foods in the last year of the project, to disseminate the problems and possible solutions that can be provided with the results obtained in the project.

Finally, some of the results obtained during the project may be disseminated in the form of scientific communications, either as posters at conferences or in scientific or informative articles. All these types of publication raise the project's profile in Spain and internationally.

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2019	Total budget: €106,265.00
Completion date (month-year):	DARP funding: €42,399.73
Current status: Underway	EU funding: €31,985.77
	Own funding: €31,879.50

With funding from:

Project funded through Operation 16.01.01 (Cooperation for Innovation) through the Catalan Rural Development Programme 2014-2020.

Order ARP/133/2017 of 21 June, approving the regulatory bases for grants for cooperation for innovation by promoting the creation of European Association for Innovation operational groups in the areas of agricultural productivity and sustainability and the execution of innovative pilot projects by those groups, and Resolution ARP/1282/2018, of 8 June, announcing the call for the grant.

