“Integrated Monitoring and Control of Foodborne Viruses in a Vegetable Production Enterprise”

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Obstacles & Success Factors

- The virological risk factors are underestimated by food producers.

- Many measures which are effective for bacterial and fungal parameters are not effective for viral parameters.

- There is a gap of knowledge on fast and reliable Food Science Decision Support Systems.

- It is suggested that all companies involved in the lettuce/leafy greens farm to table supply chain consider the recommendations contained within HACCP guidelines to ensure the safe production and handling of lettuce/leafy greens products from field to fork.

- The use of software tools like Food Science Decision Support Systems (DSS) using theories of FCMs, which have not been widely used in Food Science, can be explored and problems that can arise during the food production chain can be further studied in order to indicate the importance of some critical control points during the food production.
“Integrated Monitoring and Control of Foodborne Viruses in European Food Supply Chains”

FP7-Food, Agriculture and Fisheries, and Biotechnology

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Training Course “How to Control Viruses in the Food Supply Chain Based on HACCP Principles”
Registration Form
Travel Information
HOTEL PARK

ViTAL

Integrated Monitoring and Control of Foodborne Viruses in European Food Supply Chains

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Istituto Superiore di Sanità

ViTAL is a €3.87M EU-supported project which will provide Europe with a framework for monitoring and risk modeling, and procedures for control of foodborne virus contamination, which will be applicable to any virus, whether existing, emerging or re-emerging, that poses the danger of being transmitted by food.

Scientists will use advanced methods for virus detection throughout selected food supply chains from farm to market, to gather data on virus contamination of food and environmental sources which is suitable for quantitative viral risk assessment. Supply chains will be monitored for the presence of indicator viruses commonly found where fecal contamination has occurred. These viruses can be distinguished into strains of human and animal origin, which will indicate contamination from a specific source. Modeling tools will then be developed to define the quantitative viral risk for each scenario and to assist in identifying the potential barriers against it. Expert stakeholders from the food industry will provide information on existing control measures, evaluating the new scientific findings and communicating them to the food industry, to help produce food safety guidelines including viral hazard analyses.

MORE NEWS:

FIPS 2011 event “Faecal indicators: problem or solution? Has technical progress reduced the need for faecal indicators?”
Main Concepts

• Integrated risk assessment and management of contamination of the European farm to market food supply chain by pathogenic viruses.

1. To acquire data on virus contamination of food and environmental sources suitable for quantitative viral risk assessment.

2. To assess foodborne viral risks for determining high risk situations and efficacy of interventions.

3. To develop new measures to prevent virus contamination of foods and the environment.

4. To develop and assess measures for virus reduction and control in case of virus contamination.
Food supply chains analysed by 13 data-gathering laboratories

Food Matrices

- Soft Fruits
- Pork Products
- Salad Vegetables
- Shellfish

Stage

- Production
- Processing
- Point of Sale
Laboratories for vegetable sampling
Viruses (A big trip through environment)
Data Gathering from 3 Phases

Production

Processing

Point of Sale
Production Phase
Sample: Harvesters’ and workers’ hands
Production Phase
Samples: W.C Toilet Handles
Production Phase
Production Phase
Production Phase
Point of Sale Phase
ViTAL

VITAL PROJECT 213178
Integrated Monitoring and Control of Foodborne Viruses in European Food Supply Chains.

Questionnaire

Guidance Documents

ViTAL

Guidance document on data collection during the production phase for lettuce heads in Greece

1. The sampling plan
In ViTAL, the infection risks for humans through consumption of soft fruits, salad vegetables, pork and shellfish will be estimated by using qualitative viral risk assessment (QVRA). The outcome of the QVRA depends on the value of the data included, because these determine the accuracy and certainty of the estimates. The current sampling plan was developed using the questionnaires completed by colleagues from Greece to describe the local situation. The plan aims to benefit most from the fixed number of samples as outlined in Table 1. The total number of samples will remain as reported in the Table, but the number of samples per phase may differ as reported to allocate samples as efficiently as possible. The sampling points that were chosen based on the questionnaire are listed in Table 2.

<table>
<thead>
<tr>
<th>Sample Points</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>90</td>
</tr>
<tr>
<td>Processing</td>
<td>71</td>
</tr>
<tr>
<td>Point of sale</td>
<td>45</td>
</tr>
<tr>
<td>Total</td>
<td>212</td>
</tr>
</tbody>
</table>

2. Sampling points
The selected salad vegetable farm in Greece is coded as GR_VB by KU Leuven.

During production, the contamination of lettuce heads with NoV and HAV ultimately originates from contamination with human excreta, either through direct (e.g. physical contact) or indirect (e.g. irrigation water) contamination.

The direct contamination from humans may result from virus transfer from harvesters’ hands to the product. Harvesters’ hands may become contaminated during an acute infection that is experienced by the harvester or through the environment. Therefore, harvesters’ hands are a point for sampling. Absence of virus on the hands does not mean that hands are no source of contamination. Therefore, the doorknobs in the toilets of the toilets that are used by harvesters will be examined.
Guidance Sheets available in 6 languages (www.eurovital.org):
A Practical Tool: Construction of a Decision Support System

- Fuzzy Cognitive Maps (FCM) in modeling a Decision Support System which diagnoses the importance of Critical Control Points for the safety during the production of salad vegetables (lettuce).
Selection of critical points

C1. Labor, Manpower
C2. Quality and Safety of Food Systems
C3. Location-Surroundings of the growing field
C4. Lettuce Nursery
C5. Produce Land
C6. Harvesting the crop
C7. Postharvest Processing
C8. Transportation
C9. Point of Sale
Decision Making Support System in LETTUCE’S SAFETY USING FUZZY COGNITIVE MAPS

• The concepts that were selected to be tested during the lettuce production procedure were extracted from questionnaires that were filled from experts.

• The methodology described extracts the knowledge from experts and exploits their experience of the process.

• Each expert based on his/her experience knows the main factors that contribute to the decision.

• Experts describe the existing relationship firstly as “negative” or “positive” and secondly, as a degree of influence using a linguistic variable, such as “low”, “medium”, “high” etc.
Results

• A Guidance Sheet was produced for the prevention of contamination of leafy greens by viruses.
• A Decision Support System (DSS) was constructed for making decisions in any complex system, when individuals or a team of people are trying to solve unstructured problems on an uncertain environment.
• Increased efficiency, productivity, competitiveness, and offer cost effectiveness and high reliability, a comparative advantage over other competitors.
• The project outcomes contributed to the production of safer products.
• The enterprise participates to networks and applied to different research projects on vegetable production and safety issues after its participation in VITAL project.
Thank you for your attention

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