Survey of Microbial Quality of Fresh Herbs from Supermarkets, Local Markets and Farmer’s Markets

Amy H. Simone1, Yi Su1, Wei-Yea Hsu1, and Tung-Shi Huang2
1Institute of Food and Agricultural Sciences at the University of Florida (Contact information: asim@ufl.edu); 2Department of Poultry Science at the Auburn University

Introduction

According to U.S. outbreak data (1990-2007), produce accounts for approximately 12.3% of foodborne illness outbreaks with an identified food source. Salmonella, E. coli O157:H7, and Shigella are often responsible for such illness outbreaks in the U.S. Fresh cilantro, green onions, and jalapeño and serrano peppers eaten raw and/or used in Asian and Mexican cuisines have been reported as vehicles of these infections.

Material and Methods

A total of 201 samples (cilantro (n=51), green onions (n=50), jalapeños (n=50) and serrano pepper (n=50)) purchased from 3 types of vendors (supermarkets, local markets, and farmer’s markets) in seven cities in three states (Alabama, Georgia, and Florida) were analyzed. For APC, coliform bacteria, and E. coli detection, 3M Petrifilm plates were used. U.S. Food and Drug Administration Bacteriological Analytical Manual (FDA BAM) procedures were followed for Salmonella, E. coli O157:H7 and Shigella assays. Microbial loads were calculated and analyzed using ANOVA (SAS 9.4).

Procedures

1. Fresh produce obtained from supermarkets, local markets, and farmer’s markets.
2. Sample preparation, enumeration, isolation and identification.
3. Analysis of indicator organisms and pathogens.
4. Results and confirmation.

Results

Table 1. Microbial loads summary

<table>
<thead>
<tr>
<th>Produce item</th>
<th>APC</th>
<th>Coliform bacteria</th>
<th>E. coli</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cilantro</td>
<td>6.16-8.56</td>
<td>0*-5.68</td>
<td>0*-1.18</td>
</tr>
<tr>
<td>Green onion</td>
<td>6.05-8.42</td>
<td>0*-5.15</td>
<td>0*</td>
</tr>
<tr>
<td>Jalapeño pepper</td>
<td>4.61-6.80</td>
<td>0*-4.44</td>
<td>1.40-2.42</td>
</tr>
<tr>
<td>Serrano pepper</td>
<td>4.69-7.75</td>
<td>0*-5.52</td>
<td>0*</td>
</tr>
</tbody>
</table>

*Data from three states are included and values are ranges of indicator organisms (log CFU/g).
*Values of 0 are below the detection limit, which is 1 log CFU/g.

FIGURE 1. Populations of APC and CB in cilantro, green onions, and jalapeño and serrano peppers collected from Florida. Log values with different letters indicate statistical significance (P < 0.05).

Conclusions

• E. coli was detected only in cilantro and jalapeño pepper samples collected in Alabama (0 to 1.18 and 1.40 to 2.42 log CFU/g, respectively) (Table 1).
• Populations of coliform bacteria and APC on cilantro were significantly higher (P < 0.05) than loads on the other three produce types (Figure 1A).
• Samples purchased from farmer’s markets had higher (P < 0.05) coliform bacterial levels than samples from local markets and supermarkets in Florida (Figure 1B).
• None of the test pathogenic bacteria was detected in samples purchased in the three states.

References


Acknowledgement

This study was funded by the U.S. Department of Agriculture, National Institutes of Food & Agriculture (# 2010-51110-21097).