OBJECTIVE

➢ To determine the chemical and microbial hazards in street-vended roasted yam

➢ Compare the levels of the present hazards with Provisional Tolerable Weekly Intake (PTWI), thereby determining their trends and nutritional significance of the toxicity.

EXPERIMENTAL

Sampling, sample preparation and analysis
The Yam tubers (Dioscorea rotundata - the white yam) were sorted manually to remove rotten parts while the suitable tubers were weighed. The tubers were then peeled using steel knife. The peeled tubers were cut into smaller sizes (2.5 cm × 1.5 cm × 1 cm). Around 10 g of sample was weighed into the digestion tube and 25 ml of Nitric acid was dosed into the sample together with 5 ml of HCl and 2 ml of conc. H2SO4. The samples were heated at moderate temperature of 250°C until white fumes are observed. Each of digested samples was then aspirated for microanalytical concentration using AAS (Atomic Absorption Spectrophotometer). The readings from the readout were taken and recorded for metal elements (Pb, Cd, As, Co, & Ni). Following growth media were used for isolating the colonies – Nutrient agar (oxoid), malted salt agar (oxoid), Macconkey agar, Deoxycholate citrate agar and potato dextrose agar and prepared according to manufacturers' specification. Samples were blended using sterile tared jar (model PH 500) and approximately 10 g of the sample of the blend was homogenized in 90ml of sodium chloride solution (0.85%). Decimal dilutions were prepared with the homogenate and used for microbiological hazard analysis using the pour – plate method (1ml of each dilution).

RESULTS

Table 1: Total plate, Staphylococcal, E.coli, Salmonella and Fungi Counts (cfu/g) of Street-Vended Roasted Yam

<table>
<thead>
<tr>
<th>Samples</th>
<th>T/C (cfu/g)</th>
<th>S/T (cfu/g)</th>
<th>E/C (cfu/g)</th>
<th>S/L (cfu/g)</th>
<th>F/C (cfu/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ikeja Location A</td>
<td>9.85×10⁴d</td>
<td>6.00×10⁴d</td>
<td>6.80×10⁴d</td>
<td>3.50×10⁴c</td>
<td>1.0×10⁵a</td>
</tr>
<tr>
<td>Ikeja Location B</td>
<td>2.97×10⁶c</td>
<td>4.85×10⁶c</td>
<td>7.20×10⁶c</td>
<td>5.00×10⁵a</td>
<td>1.0×10⁷c</td>
</tr>
<tr>
<td>Ojodu Location C</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>1.0×10⁵c</td>
</tr>
<tr>
<td>Ojodu Location D</td>
<td>2.99×10⁶b</td>
<td>3.00×10⁶b</td>
<td>3.60×10⁶b</td>
<td>6.00×10⁵b</td>
<td>7.0×10⁶b</td>
</tr>
<tr>
<td>Agege Location E</td>
<td>2.25×10⁶d</td>
<td>2.40×10⁶d</td>
<td>1.40×10⁶c</td>
<td>8.00×10⁵b</td>
<td>7.0×10⁶b</td>
</tr>
<tr>
<td>Agege Location F</td>
<td>1.17×10⁶c</td>
<td>3.00×10⁶c</td>
<td>3.00×10⁶c</td>
<td>Nil</td>
<td>1.0×10⁷c</td>
</tr>
<tr>
<td>Ogba Location G</td>
<td>8.00×10⁷a</td>
<td>1.00×10⁷a</td>
<td>5.00×10⁷a</td>
<td>1.0×10⁷a</td>
<td>Nil</td>
</tr>
<tr>
<td>Ogba Location H</td>
<td>2.17×10⁶c</td>
<td>2.65×10⁶c</td>
<td>5.00×10⁶c</td>
<td>9.0×10⁶a</td>
<td>Nil</td>
</tr>
<tr>
<td>Laboratory control</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>1.0×10⁶c</td>
</tr>
</tbody>
</table>

Means on the same column having different superscripts are significantly different at p<0.05

Key: T/C – Total plate count; S/T – Staphylococcal counts; E/C – E.coli count; S/L – Salmonella count; F/C – Fungi

DISCUSSION

The result of the microbial counts in the vended samples showed the presence of the microorganisms which may be attributed to improper cleaning, handling during processing and unhygienic condition of the equipment used by the vendors as well as unhygienic display of these products during vending. While the presence of E.coli and Salmonella suggests unhygienic practices by processors, rendering the food product unwholesome and these could result in arthritis, brain and nervous problems and blood poisoning in consumers.

The presence of Cd in these food samples may be attributed to Cd released into the environment especially from household waste and automobile exhaust (Droege, 2003). Since, Cd is carcinogenic and long time exposure to low levels can contribute to kidney diseases, lung damage and fragile bones.

Arsenic may also be attributed to the release of arsenic into the environment by flames produced on daily basis from vehicles due to high traffic density of these areas as well as by the manufacturing of some chemicals which found their way into the environment (Roberts, 1999).

However, regular consumers of these products especially when consumed above permissible tolerable weekly intake (PTWI) level are liable to die young because target organs for arsenic are the blood, kidneys, central nervous, digestive and skin systems.

Lead (Pb), being a component of traffic exhaust could settle on these foods as well as industrial pollution and waste which later find their way into public environment. The high levels of Pb in the raw yam sample may probably be attributed to pollutants in irrigation water, farm soil or due to pollution from the highways traffic (Qu et al., 2000). Cobalt has little direct activity on its own in the body as it is an integral component of vitamin B12 and as such its effects, sources and uses are very similar to that of vitamin B12. It is involved in preventing and treating pernicious anemia and also helps in red blood cell production. Co also supports normal nervous system functions (Sobukola et al., 2008).

However, all the vended roasted yam samples investigated in this study were observed to exceed provisional tolerable intake limit except the laboratory sample. Samples K, L, M and the raw sample were observed to exceed the recommended limit. Thus, the daily consumption of these foods gradually poses health hazard to the consumers.

CONCLUSIONS

The results of the analyses carried out on roasted yam showed clearly that exhaust fumes from vehicles and other environmental pollutants (especially heavy metals and microbes) have adverse effects on the quality of street-vended roasted yam. Arsenic was found to be the highest in all the food samples while Cadmium was not detected at all. The concentrations of the arsenic in all the food samples from different traffic areas were higher than the level permitted for humans while those of the nickel were within the permitted level. For lead, only sample D was observed to be within the limit while samples A, E, F, I & L are within the level permitted for cadmium.

SELECTED REFERENCES


Acknowledgements: The organizers of the World Congress on Root and Tuber Crops (WCRTC) is acknowledged for sponsoring the 1st author’s participation at NANNING.