**New Crop Testing Nutritional and Organoleptic Analysis**

LaShelle E. Spencer¹*, Jess M. Bunchek² and Mathew W. Romeyn³

¹AECOM/LASSO, Kennedy Space Center, FL; ²SURA/LASSO, Kennedy Space Center, FL ³NASA, Kennedy Space Center, FL

*Presenter contact: lashelle.e.spencer@nasa.gov

**Background**

- Long-duration missions beyond low Earth orbit will encounter challenges in maintaining adequate nutrition and acceptability in the food system.
- In situ production of fresh produce can supplement nutrients deficient in the stored diet.
- Our goal is to increase the number of crops that meet nutritional requirements and crew acceptability, which can be reliably grown in space under narrow band LEDs and elevated CO₂ (~3000 ppm).
- A variety of crop types are necessary to address known nutritional deficits (Vitamin C, Vitamin K, Potassium) in the stored astronaut diet, including leafy greens, which are discussed here.

**Materials and Methods**

- All test plants were grown 4 inch pots containing 70:30 Fafard 2B:Arcillite media, in controlled environmental chambers under the following conditions: 3000 ppm CO₂, 50% Relative Humidity, 23°C, and PPF ~300µmol m⁻² s⁻¹ (Fig. 1).
- Plants were automatically fertigated with 1200µS Peters 13-2-13 and harvested 28 days after planting (Fig. 2).
- Light source: Heliospectra RX30
  - Near UV (385nm) ~5 µmol m⁻² s⁻¹, 50% Red (630 and 660nm), 27% Green (530nm), and 23% Blue (450nm).
- Samples were nutritionally analyzed by outside lab (Eurofins, Des Moines, IA) for proximate analysis, Fe, Mg, P, K, S, Vit. B1, Vit. C and Vit. K1.
- Samples were washed, packaged and shipped to Johnson Space Center Food Laboratory for Organoleptic testing (Fig. 3).

**Results**

**Nutritional**

- Of the eight cultivars tested, ‘Toscano’ Kale tested most nutrient dense containing the highest levels of P, Mg, Ca, Vit. C and calories.
- Vit. K1 (1.32-2.03 µg/g FW) and Potassium (0.40-0.77%) content tested similar among all cultivars.
- Vitamin C varied the most between crop types.

**Organoleptic Testing**

- All crops passed overall acceptability with a average score of 6 or higher.
- ‘Dragoon’ Lettuce tested the highest with an average score of 7.6.

**Overall Organoleptic Acceptability**

<table>
<thead>
<tr>
<th></th>
<th>Average Score (Scale = 1-9)</th>
<th>Selected Taster Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Amara’ Mustard</td>
<td>6.6</td>
<td>Interesting sample. Aftertaste is similar to eating green beans.</td>
</tr>
<tr>
<td>Barese’ Swiss Chard</td>
<td>6.2</td>
<td>Fine if you’re expecting to eat it raw...though I prefer to eat it cooked.</td>
</tr>
<tr>
<td>‘Dragoon’ Lettuce</td>
<td>7.6</td>
<td>I like this one quite a lot. It’s not too bitter,…would go well on a sandwich or maybe [used as a] wrap.</td>
</tr>
<tr>
<td>‘Outredgeous’ Lettuce</td>
<td>6.6</td>
<td>I like the color and texture. There isn’t much aroma and flavor, but that’s what I expect from lettuce.</td>
</tr>
<tr>
<td>‘Extra Dwarf’ Pak Choi</td>
<td>6.8</td>
<td>Good texture with some crunchiness, flavor is ok with some bitterness/earthiness</td>
</tr>
<tr>
<td>‘Red Russian’ Kale</td>
<td>6.7</td>
<td>I really liked the vivid green color with the purple. It has a strong taste.</td>
</tr>
<tr>
<td>‘Shungiku’</td>
<td>6.2</td>
<td>Nice parsley-like flavor.</td>
</tr>
<tr>
<td>‘Toscano’ Kale</td>
<td>6.6</td>
<td>Very good texture and appearance. A little bitter.</td>
</tr>
</tbody>
</table>

All crops passing.

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