Impact of co-mingling rice cultivar lots on milling yields and quality

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Differences have been observed in the milling properties of different rice cultivars, particularly between hybrid and pureline cultivars.

Co-mingled samples were mixed using a Satake rice grader for 2 minutes.

Samples were prepared from bulk lots using a Boerner divider to obtain representative samples.

Co-mingling Mass Percentages

<table>
<thead>
<tr>
<th>Co-mingled Mass Percentages</th>
<th>CL XL745/CL 151 (H/P)</th>
<th>CL XL729/CL XL745 (H/H)</th>
<th>CL 151/Wells (P/P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/90</td>
<td>25/75</td>
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<td>25/75</td>
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Two years- 2011 (high HRY with a mean of 62.5%) and 2012 (low HRY with a mean of 44.6%).

- Samples were dehulled in a laboratory sheller.
- Brown Rice Properties
  - Length, width, thickness, chalkiness, total lipid content (TLC) of individual cultivar lots.
• Milled for 10, 20, 30, or 40 s
• Head rice separated
• Milling properties determined
  – Milled rice yield (MRY)
  – Head rice yield (HRY)
  – Surface lipid content (SLC) of head rice
  – Head rice whiteness ($L^*$) and yellowness ($b^*$)
  – Head rice chalkiness
• The experiment was replicated four times, requiring 480 samples to be milled.

Statistical Analysis (contd.)
• Means Comparison
  – Head rice chalkiness was measured for milling durations that produced a DOM level closest to 0.4% SLC (30 s for 2011 samples and 20 s for 2012 samples).

Results

Similarly, $L^*$ values increased linearly, whereas $b^*$ values decreased linearly, with increases in milling duration.

Statistical Analysis
(for each co-mingled sample and individual-cultivar lot)

• Regression Analysis:
  – SLC vs. Milling Duration
  – MRY vs. SLC
  – HRY vs. SLC
  – $L^*$ vs. SLC
  – $b^*$ vs. SLC
Millling duration, MRY, HRY, $L^*$ and $b^*$ values adjusted to a DOM level of 0.4% SLC.
SLC vs. Milling Duration

Milling properties of individual-cultivar lots

<table>
<thead>
<tr>
<th>Year</th>
<th>Cultivar</th>
<th>At a DOM of 0.4% SLC</th>
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<td>Milling duration (s)</td>
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<td></td>
<td>CL 151</td>
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<td></td>
<td>CL XL745</td>
<td>28.3</td>
</tr>
<tr>
<td></td>
<td>CL XL729</td>
<td>25.3</td>
</tr>
<tr>
<td>2012</td>
<td>Wells</td>
<td>19.5</td>
</tr>
<tr>
<td></td>
<td>CL 151</td>
<td>24.8</td>
</tr>
<tr>
<td></td>
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<td>CL XL729</td>
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Milling Duration to attain 0.4% SLC in the CL XL745/CL151 (H/P) co-mingle

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Milling Duration to attain 0.4% SLC in the CLXL745/CL XL729 (H/H) co-mingle.

- **2011**

  - Longer kernels:
    - CL XL745
    - CL XL729

- **2012**

  - Longer kernels:
    - CL XL745
    - CL XL729

Trends in width of CL XL745 and CL XL729 kernels reversed over the two years while trends in other brown rice properties remained the same.

Milled Rice Yield (MRY) in the CL XL745/CL 151 (H/P) co-mingle (adjusted to 0.4% SLC)

- **2011**

  - CL XL745:
    - Wells
    - CL 151

- **2012**

  - CL XL745:
    - Wells
    - CL 151

Trends in bulk densities of Wells and CL 151 kernels reversed over the two years while trends in other brown rice properties remained the same.
**Head Rice Yield (HRY) in the CL XL745/CL 151 (H/P) co-mingle (adjusted to 0.4% SLC)**

- 2011
- % CL XL745 : % CL 151

**Head Rice Chalkiness in the CL XL745/CL 151 co-mingle**

- 2011
- % CL XL745 : % CL 151

**Head Rice Yield (HRY) in the CL XL745/CL 151 (H/P) co-mingle (adjusted to 0.4% SLC)**

- 2011
- 2012
- % CL XL745 : % CL 151

**Head Rice Chalkiness in the CL XL745/CL 151 co-mingle**

- 2011
- 2012
- % CL XL745 : % CL 151

**Comparison of HRY to weighted avg. HRY**

- 2011
- 2012

**Conclusions**

- MRY, HRY and head rice chalkiness of comingled samples increased or decreased with an increase in percentage of a given cultivar in a co-mingle.
- However, a small, deleterious impact was observed on HRYs of co-mingled samples when cultivar lots having poor HRYs were co-mingled.
- Co-mingling did not affect color of co-mingled samples.
Thank You

Questions ???