



THE NATIONAL
FOOD LAB

RICE LIFE STUDY

Final Report –26468

Eurofins Product Testing

March 2022

EXECUTIVE SUMMARY

The National Food Lab conducted consensus descriptive shelf life testing on 14 Rice samples stored at 70°F and 100°F over the course of 24 months.

- Based on sensory results:
 - The recommended shelf life of **Medium Grain White** is 6 months at 100°F and 24 months at 70°F.
 - The recommended shelf life of **Medium Grain Brown** is 6 months at 100°F and 18 months at 70°F
 - The recommended shelf life of **Medium Grain Quick Cook Brown** is 6 months at 100°F and 15 months at 70°F
 - The recommended shelf life of **Long Grain White** is 9 months at 100°F and 24 months at 70°F
 - The recommended shelf life of **Long Grain Brown** is 9 months at 100°F and 15 months at 70°F
 - The recommended shelf life of **Short Grain White** is 9 months at 100°F and 24 months at 70°F
 - The recommended shelf life of **Short Grain Brown** is 9 months at 100°F and 15 months at 70°F
 - The recommended shelf life of **Wild Rice Parched** is 6 months at 100°F and 12 months at 70°F
 - The recommended shelf life of **Wild Rice Parboiled** is 6 months at 100°F and 6 months at 70°F
 - The recommended shelf life of **White Rice Flour** is 6 months at 100°F and 12 months at 70°F
 - The recommended shelf life of **Brown Rice Flour** is 9 months at 100°F and 18 months at 70°F
 - The recommended shelf life of **Reconstituted Brown Rice Flour** is 6 months at 100°F and 6 months at 70°F
 - The recommended shelf life of **White Sweet Rice** is 6 months at 100°F and 15 months at 70°F
 - The recommended shelf life of **Brown Sweet Rice** is 6 months at 100°F and 24 months at 70°F

BACKGROUND AND OBJECTIVE

BACKGROUND

- Eurofins Consumer Product Testing has a client (California Rice Commission) who wanted to conduct shelf life testing on 14 of their rice products. Their goal was to validate a shelf life of 24 months for each of these products.

OBJECTIVE

- To conduct quantitative and narrative descriptive shelf life testing on 14 SKUs of rice to validate they meet a minimum 24 month shelf life using a trained descriptive panel.
- To conduct accelerated shelf life testing to determine an approximate acceleration rate of change as compared to ambient storage.
- To conduct analytical testing for those same samples over the course of shelf life

PRODUCT DESCRIPTION

Rice Samples:

1. Medium Grain (White)
2. Medium Grain (Brown)
3. Medium Grain (Quick Cook Brown)
4. Long Grain (White)
5. Long Grain (Brown)
6. Short Grain (White)
7. Short Grain (Brown)
8. Wild Rice (Parched)
9. Wild Rice (Parboiled)
10. White Rice Flour 2-3 Ply paper bag
11. Brown Rice Flour 2-3 Ply paper bag
12. Reconstituted Brown Rice Flour 2-3 Ply paper bag
13. White Sweet Rice
14. Brown Sweet Rice

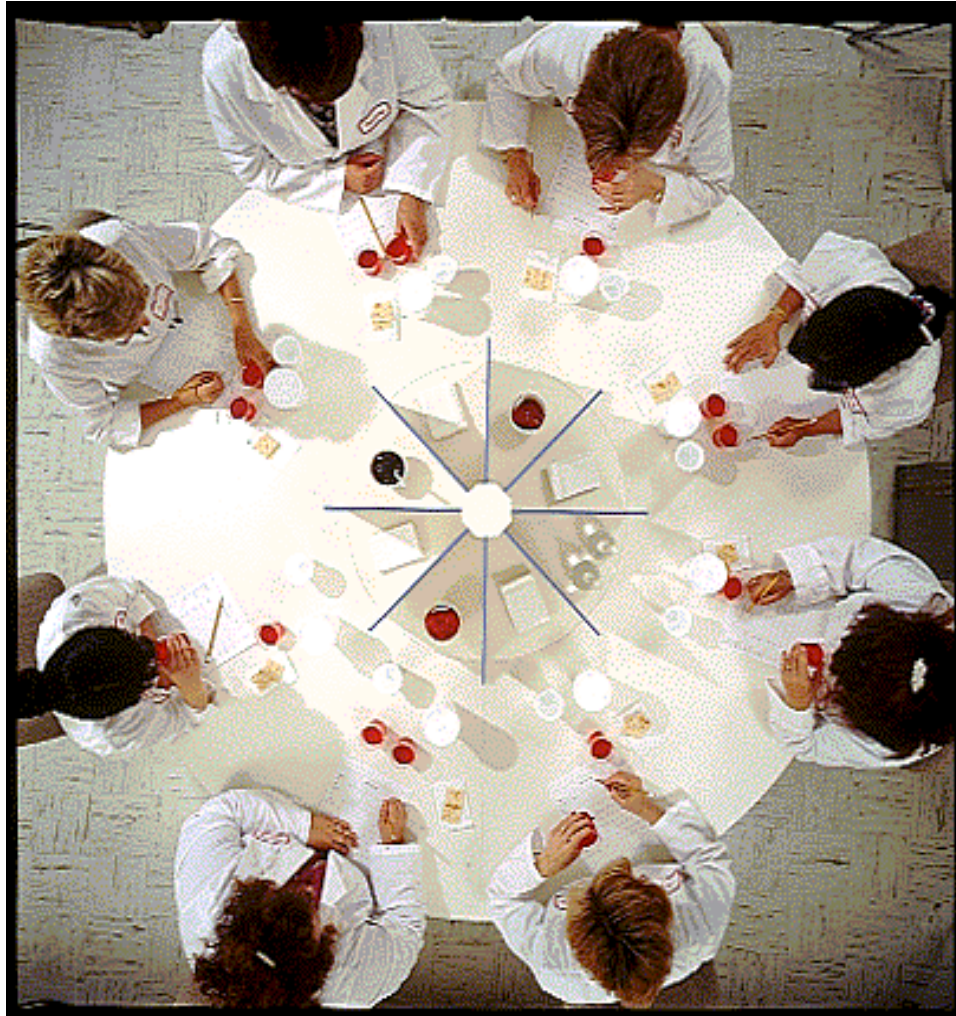
EVALUATION SCHEDULE

Storage Time	Test Start Date	Storage Temperature		
		0°F	70°F	100°F
Initial	3/5/2020	S/A		
3 Month	6/4/2020	S	A	S/A
6 Month	8/3/2020	S	S/A	S/A
9 Months	12/1/2020	S	A	S/A
12 Months	3/1/2021	S	S/A	S/A (Wild Rice (Parboiled) Only)
15 Months	6/1/2021	S	S/A	
18 Months	8/30/2021	S	S/A	
21 Months	11/30/2021	S	S/A	
24 Months	3/1/2022	S	S/A	

S: Sensory Evaluation
A: Analytical Evaluation

METHODOLOGY

QUANTITATIVE CONSENSUS METHODOLOGY



- Descriptive testing was conducted by The National Food Lab using trained panelists.
- Three trained descriptive panelists individually rated the samples' attributes on 15-point scales.
- The individual scores were verbally collected by a panel leader and were discussed to reach consensus scores.
- Narrative feedback was also collected.
- No statistical analyses were conducted on the consensus descriptive data.
- **QUALITY RATING:** The panelists also rated each sample as acceptable, borderline, or unacceptable in quality based on differences from the initial sample evaluation.
- A detailed methodology is appended.

KEY FINDINGS



QUALITY RATING CONTEXT

The panelists rated each sample as acceptable, borderline, or unacceptable in quality based on differences from the control sample stored at 0°F.

SHELF LIFE FINDINGS – MEDIUM GRAIN WHITE RICE

Compared to the control (held at 0°F) and initial ratings, **Medium Grain White Rice** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Borderline at *9 months* of storage at 100°F
- Acceptable up to *24 months* of storage at 70°F

Changes over time at 70°F mainly included less Clumping (wet), more Total Off Aroma (Dry) and more Starch aroma (wet)

SHELF LIFE FINDINGS – MEDIUM GRAIN BROWN RICE

Compared to the control (held at 0°F) and initial ratings, **Medium Grain Brown Rice** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Borderline at *9 months* of storage at 100°F
- Acceptable for up to *18 months* of storage at 70°F
- Borderline from *21 to 24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- Lower Sweet Aromatic, Brown Rice/Grain and Toasted aroma (wet)
- Lower Sweetness
- More Total Off Aroma (including Cardboard, Plastic and Oxidized notes in dry sample and mainly Oxidized notes in wet sample)
- More Total Off Flavor (including mainly Oxidized/Rancid notes)

SHELF LIFE FINDINGS – MEDIUM GRAIN QUICK COOK BROWN RICE

Compared to the control (held at 0°F) and initial ratings, **Medium Grain Quick Cook Brown Rice** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Borderline at *9 months* of storage at 100°F
- Acceptable for up to *12 months* of storage at 70°F
- Acceptable/Borderline at *15 months* of storage at 70°F
- Borderline from *18 to 21 months* of storage at 70°F
- Borderline/Unacceptable at *24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- Lighter color (dry)
- Lower Dried Rice/Grain aroma (dry), Sweet Aromatic aroma (wet), Sweetness, and Sweet Aromatic flavor
- More Total Off Aroma (including Cardboard notes in dry and wet sample)
- More Total Off Flavor

SHELF LIFE FINDINGS – LONG GRAIN WHITE RICE

Compared to the control (held at 0°F) and initial ratings, **Long Grain White Rice** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Acceptable/Borderline at *9 months* of storage at 100°F
- Acceptable for up to *12 months* of storage at 70°F
- Acceptable/Borderline from *15 to 24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- Lower Total Flavor due to lower White Rice flavor
- More Total Off Aroma (including Cardboard notes) (dry)
- More Total Off Flavor (including Cardboard notes)
- More Starchy Mouthfeel

SHELF LIFE FINDINGS – LONG GRAIN BROWN RICE

Compared to the control (held at 0°F) and initial ratings, **Long Grain Brown Rice** was found to be:

- Acceptable for up to *9 months* of storage at 100°F
- Acceptable for up to *15 months* of storage at 70°F
- Borderline from *18 to 24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- Lighter color (wet)
- Lower Dried Rice/Grain aroma (dry), Total Aroma (wet), Sweet Aromatic aroma (wet), and Malted aroma (wet)
- Lower Sweetness, Sweet Aromatic flavor and Malted flavor
- More Total Off Aroma (including Cardboard notes) (dry)
- More Total Off Aroma (wet)

SHELF LIFE FINDINGS – SHORT GRAIN WHITE RICE

Compared to the control (held at 0°F) and initial ratings, **Short Grain White Rice** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Acceptable/Borderline at *9 months* of storage at 100°F
- Acceptable for up to *24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- Lower Dried Rice aroma (dry)
- More Total Off Aroma (including Cardboard notes) (dry)
- More Dried Husk/Earthy flavor

SHELF LIFE FINDINGS – SHORT GRAIN BROWN

Compared to the control (held at 0°F) and initial ratings, **Short Grain Brown Rice** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Acceptable for up to *15 months* of storage at 70°F
- Borderline from *18 to 24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- Less Awareness of Individual Grains (texture)
- More Total Off Aroma (including Oxidized and Cardboard notes) (dry)
- More Total Off Flavor (including Cardboard notes)

SHELF LIFE FINDINGS – WILD RICE PARCHED

Compared to the control (held at 0°F) and initial ratings, **Wild Rice Parched** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Borderline/Unacceptable at *9 months* of storage at 100°F
- Acceptable for up to *12 months* of storage at 70°F
- Borderline from *15 to 18 months* of storage at 70°F
- Borderline/Unacceptable from *21 to 24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- Lower Woody aroma (dry)
- Lower Total Aroma due to less Grain/Rice aroma (wet)
- More Sour Aromatic aroma (wet)
- More Firmness (texture) and Awareness of Individual Grains (texture)

SHELF LIFE FINDINGS – WILD RICE PARBOILED

Compared to the control (held at 0°F) and initial ratings, **Wild Rice Parboiled** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Borderline/Unacceptable at *9 months* of storage at 100°F
- Unacceptable at *12 months* of storage at 100°F
- Acceptable for up to *6 months* of storage at 70°F
- Borderline at *12 months* of storage at 70°F
- Borderline/Unacceptable from *15 to 18 months* of storage at 70°F
- Unacceptable from *21 to 24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- More Total Aroma due to more Dried Husk/Hay aroma (dry)
- More Total Off Aroma (including Cardboard notes) (wet)
- More Total Off Flavor (including Cardboard notes)
- More Firmness (texture)

SHELF LIFE FINDINGS – WHITE RICE FLOUR

Compared to the control (held at 0°F) and initial ratings, **White Rice Flour** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Borderline/Unacceptable at *9 months* of storage at 100°F
- Acceptable for up to *12 months* of storage at 70°F
- Borderline/Unacceptable from *15 to 24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- Lower Total Aroma due to less Cooked Starch aroma (wet)
- Lower Cooked Rice Starch flavor and Raw Rice Flour flavor
- Lower Moistness (texture)
- More Cardboard aroma (dry)
- More Total Off Flavor (including Cardboard notes)

SHELF LIFE FINDINGS – BROWN RICE FLOUR

Compared to the control (held at 0°F) and initial ratings, **Brown Rice Flour** was found to be:

- Acceptable for up to *9 months* of storage at 100°F
- Acceptable for up to *15 months* of storage at 70°F
- Acceptable/Borderline at *18 months* of storage at 70°F
- Borderline from *21 to 24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- Lower Sweet Aromatic aroma (dry) and Husk/Hay aroma (dry)
- Lower Sweet Aromatic aroma (wet)
- More Cardboard aroma (dry)
- More Total Off Flavor (including Cardboard notes)
- More Powdery Mouthfeel (texture)

SHELF LIFE FINDINGS – RECONSTITUTED BROWN RICE FLOUR

Compared to the control (held at 0°F) and initial ratings, **Reconstituted Brown Rice Flour** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Borderline at *9 months* of storage at 100°F
- Acceptable at *6 months* of storage at 70°F
- Borderline at *12 months* of storage at 70°F
- Borderline/Unacceptable at *15 months* of storage at 70°F
- Unacceptable from *18 to 24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- Lower Sweet Aromatic aroma (dry) and Husk/Hay aroma (dry)
- Lower Total Aroma (wet) due to lower Cooked Starch aroma, Sweet Aromatic aroma, Malted aroma, and Husk/Hay aroma
- Lower Cooked Rice Starch flavor
- Less Chewiness and Lower Cohesiveness of Mass (texture)
- Darker color (dry)
- More Cardboard aroma (dry)
- More Total Off Aroma (wet)
- More Bitterness
- More Total Off Flavor (including Cardboard notes)
- More Firmness (texture)

SHELF LIFE FINDINGS – WHITE SWEET RICE

Compared to the control (held at 0°F) and initial ratings, **White Sweet Rice** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Unacceptable at *9 months* of storage at 100°F
- Acceptable for up to *12 months* of storage at 70°F
- Acceptable/Borderline at *15 months* of storage at 70°F
- Borderline from *18 to 24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- Lower Dried Husk/Hay aroma (dry)
- Lower White Rice aroma (wet)
- More Total Off Flavor (including Cardboard notes)

SHELF LIFE FINDINGS – BROWN SWEET RICE

Compared to the control (held at 0°F) and initial ratings, **Brown Sweet Rice** was found to be:

- Acceptable for up to *6 months* of storage at 100°F
- Borderline/Unacceptable at *9 months* of storage at 100°F
- Acceptable for up to *24 months* of storage at 70°F

Changes over time at 70°F mainly included:

- More Total Off Aroma (including mainly Cardboard notes) (dry)
- More Total Off Flavor (including Cardboard notes)

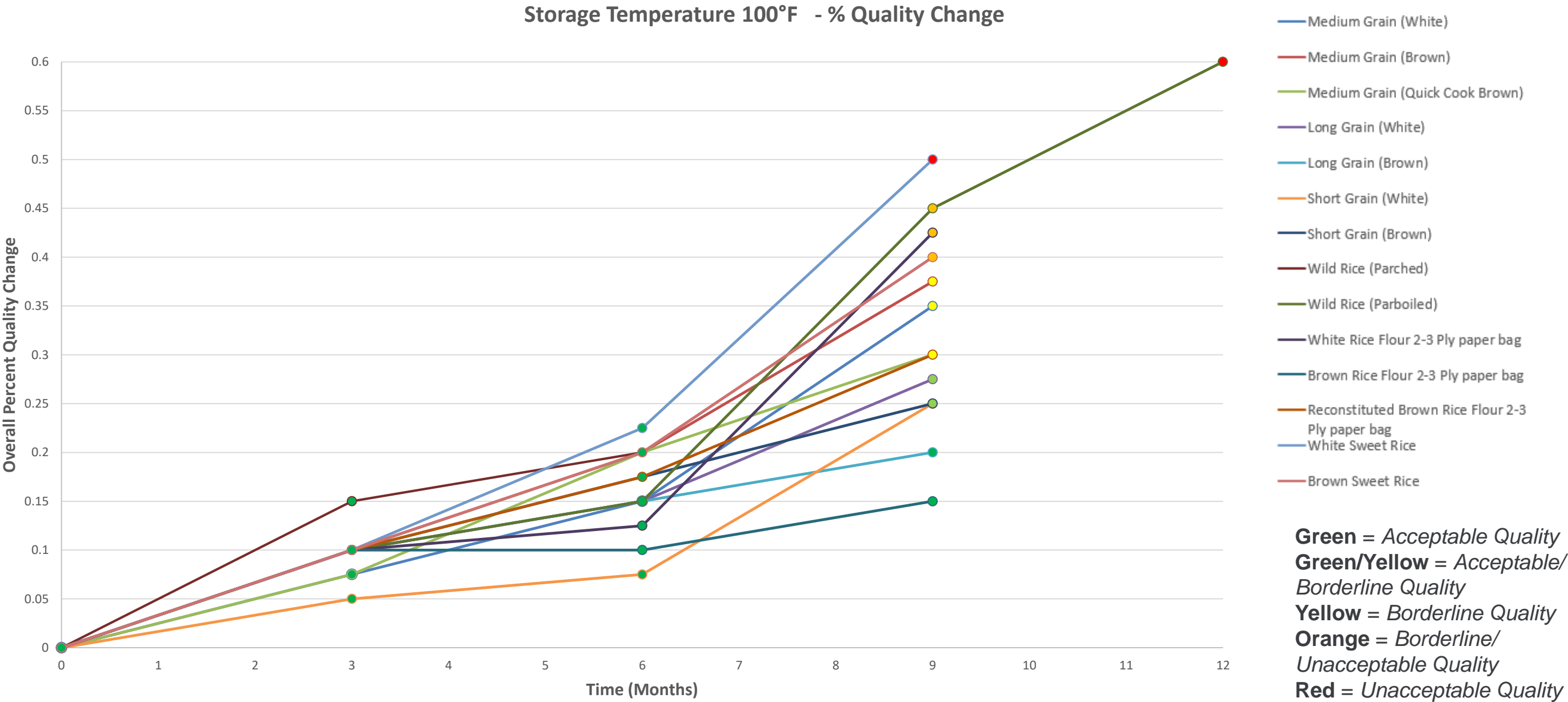
SHELF LIFE RESULTS

	100 °F				70 °F					
	3 Month	6 Month	9 Month	12 Month	6 Month	12 Month	15 Month	18 Month	21 Month	24 Month
Medium Grain (White)	5-10% Acceptable	15% Acceptable	35% Borderline		0-5% Acceptable	5-10% Acceptable	10-15% Acceptable	10-15% Acceptable	10-15% Acceptable	15-20% Acceptable
Medium Grain (Brown)	10% Acceptable	20% Acceptable	35-40% Borderline		10% Acceptable	15% Acceptable	15-20% Acceptable	20-25% Acceptable	30% Borderline	30-35% Borderline
Medium Grain (Quick Cook Brown)	5-10% Acceptable	20% Acceptable	30% Borderline		5-10% Acceptable	10-15% Acceptable	25-30% Acceptable/Bo rderline	35% Borderline	35-40% Borderline	40% Borderline/Un acceptable
Long Grain (White)	10% Acceptable	15% Acceptable	25-30% Acceptable/Bo rderline		0-5% Acceptable	10-15% Acceptable	25% Acceptable/Bo rderline	25% Acceptable/Bo rderline	25% Acceptable/Bo rderline	25% Acceptable/Bo rderline
Long Grain (Brown)	10% Acceptable	15% Acceptable	20% Acceptable		10% Acceptable	15% Acceptable	20-25% Acceptable	35% Borderline	35-40% Borderline	35-40% Borderline
Short Grain (White)	5% Acceptable	5-10% Acceptable	25% Acceptable/Bo rderline		0-5% Acceptable	5-10% Acceptable	20% Acceptable	20% Acceptable	20-25% Acceptable	20-25% Acceptable
Short Grain (Brown)	10% Acceptable	15-20% Acceptable	25% Acceptable/Bo rderline		5-10% Acceptable	20% Acceptable	20-25% Acceptable	30-35% Borderline	35% Borderline	35% Borderline
Wild Rice (Parched)	15% Acceptable	20% Acceptable	40% Borderline/Un acceptable		10% Acceptable	15% Acceptable	30-35% Borderline	35% Borderline	40-45% Borderline/Un acceptable	40-45% Borderline/Un acceptable

SHELF LIFE RESULTS (CONT.)

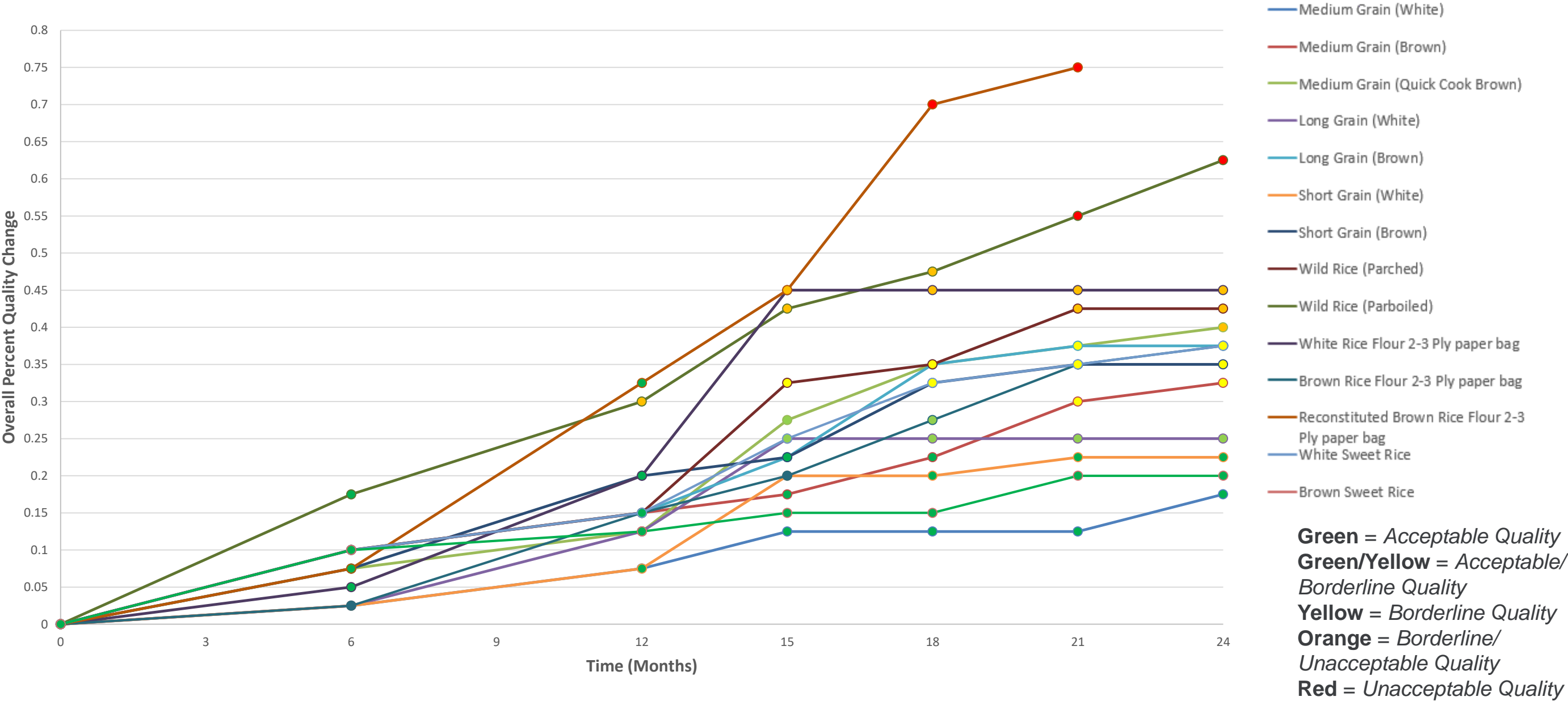
	100 °F				70 °F					
	3 Month	6 Month	9 Month	12 Month	6 Month	12 Month	15 Month	18 Month	21 Month	24 Month
Wild Rice (Parboiled)	10% Acceptable	15% Acceptable	45% Borderline/Un acceptable	60% Unacceptable	15-20% Acceptable	30% Borderline	40-45% Borderline/Un acceptable	45-50% Borderline/Un acceptable	55% Unacceptable	60-65% Unacceptable
White Rice Flour 2-3 Ply paper bag	10% Acceptable	10-15% Acceptable	40-45% Borderline/Un acceptable		5% Acceptable	20% Acceptable	45% Borderline/Un acceptable	45% Borderline/Un acceptable	45% Borderline/Un acceptable	45% Borderline/Un acceptable
Brown Rice Flour 2-3 Ply paper bag	10% Acceptable	10% Acceptable	15% Acceptable		0-5% Acceptable	15% Acceptable	20% Acceptable	25-30% Acceptable/Bo rderline	35% Borderline	35-40% Borderline
Reconstituted Brown Rice Flour 2-3 Ply paper bag	10% Acceptable	15-20% Acceptable	30% Borderline		5-10% Acceptable	30-35% Borderline	45% Borderline/Un acceptable	70% Unacceptable	75% Unacceptable	
White Sweet Rice	10% Acceptable	20-25% Acceptable	50% Unacceptable		10% Acceptable	15% Acceptable	25% Acceptable/Bo rderline	30-35% Borderline	35% Borderline	35-40% Borderline
Brown Sweet Rice	10% Acceptable	20% Acceptable	40% Borderline/Un acceptable		10% Acceptable	10-15% Acceptable	15% Acceptable	15% Acceptable	20% Acceptable	20% Acceptable

PERCENT QUALITY CHANGE OVER TIME — 100°F



PERCENT QUALITY CHANGE OVER TIME — 70°F

Storage Temperature 70°F - % Quality Change



APPENDIX FILES

- Methodology
- Results Table
- Analytical Results



Methodology



Consensus Tables



Narrative Tables



COA Files



Analytical
Summary

CONTRIBUTORS

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