

Jam Optimization using Sensory Evaluation

Maksuda Aktar Toma

2025-04-30

University of Nebraska–Lincoln

Introduction

- **Objective:** Evaluate how Aronia and Sugar levels affect sensory qualities of jam.

Introduction

- **Objective:** Evaluate how Aronia and Sugar levels affect sensory qualities of jam.
- **Motivation:** Promote Aronia berries through value-added, health-beneficial products.

Introduction

- **Objective:** Evaluate how Aronia and Sugar levels affect sensory qualities of jam.
- **Motivation:** Promote Aronia berries through value-added, health-beneficial products.
- **Approach:** Use second-order response surface models and ANOVA to explore optimal formulation.

Data Summary

- 12 Aronia jam recipes

Data Summary

- 12 Aronia jam recipes
- Ratings collected for:

Data Summary

- 12 Aronia jam recipes
- Ratings collected for:
 - Texture

Data Summary

- 12 Aronia jam recipes
- Ratings collected for:
 - Texture
 - Flavor

Data Summary

- 12 Aronia jam recipes
- Ratings collected for:
 - Texture
 - Flavor
 - Sweetness

Data Summary

- 12 Aronia jam recipes
- Ratings collected for:
 - Texture
 - Flavor
 - Sweetness
 - Aftertaste

Data Summary

- 12 Aronia jam recipes
- Ratings collected for:
 - Texture
 - Flavor
 - Sweetness
 - Aftertaste
 - Overall Liking

Data Summary

- 12 Aronia jam recipes
- Ratings collected for:
 - Texture
 - Flavor
 - Sweetness
 - Aftertaste
 - Overall Liking
- Predictors: Aronia (g), Sugar (g)

- Second-order polynomial model:

$$\text{Score} = \beta_0 + \beta_1 A + \beta_2 S + \beta_3 A^2 + \beta_4 S^2 + \beta_5 AS + \varepsilon$$

Model Structure

- Second-order polynomial model:

$$\text{Score} = \beta_0 + \beta_1 A + \beta_2 S + \beta_3 A^2 + \beta_4 S^2 + \beta_5 AS + \varepsilon$$

- Estimated separately for each sensory attribute.

ANOVA Highlights

- **Texture:** A, S have moderate linear effects.

ANOVA Highlights

- **Texture:** A, S have moderate linear effects.
- **Flavor:** A significant, interaction term borderline.

ANOVA Highlights

- **Texture:** A, S have moderate linear effects.
- **Flavor:** A significant, interaction term borderline.
- **Sweetness:** Significant effect from A, curved trend.

ANOVA Highlights

- **Texture:** A, S have moderate linear effects.
- **Flavor:** A significant, interaction term borderline.
- **Sweetness:** Significant effect from A, curved trend.
- **Aftertaste:** Some interactions are significant.

ANOVA Highlights

- **Texture:** A, S have moderate linear effects.
- **Flavor:** A significant, interaction term borderline.
- **Sweetness:** Significant effect from A, curved trend.
- **Aftertaste:** Some interactions are significant.
- **Overall:** A, S, and S^2 terms significant.

Optimization Results

- Best flavor: **1719g Aronia, 1724g Sugar**

Optimization Results

- Best flavor: **1719g Aronia, 1724g Sugar**
- Best texture: **1719g Aronia, 2017g Sugar**

Optimization Results

- Best flavor: **1719g Aronia, 1724g Sugar**
- Best texture: **1719g Aronia, 2017g Sugar**
- Best sweetness: **2268g Aronia, 1794g Sugar**

Optimization Results

- Best flavor: **1719g Aronia, 1724g Sugar**
- Best texture: **1719g Aronia, 2017g Sugar**
- Best sweetness: **2268g Aronia, 1794g Sugar**
- Best aftertaste: **2024g Aronia, 2370g Sugar**

Optimization Results

- Best flavor: **1719g Aronia, 1724g Sugar**
- Best texture: **1719g Aronia, 2017g Sugar**
- Best sweetness: **2268g Aronia, 1794g Sugar**
- Best aftertaste: **2024g Aronia, 2370g Sugar**
- Best overall: **1719g Aronia, 1480g Sugar**

Key Visualizations

- 3D surface plots showing optimal regions for each attribute

Key Visualizations

- 3D surface plots showing optimal regions for each attribute
- ANOVA table with significance levels

Key Visualizations

- 3D surface plots showing optimal regions for each attribute
- ANOVA table with significance levels
- Predicted vs. actual score diagnostics

Conclusion

- **Aronia** strongly influences most sensory scores.

Conclusion

- **Aronia** strongly influences most sensory scores.
- **Sugar** enhances aftertaste and balances Aronia.

Conclusion

- **Aronia** strongly influences most sensory scores.
- **Sugar** enhances aftertaste and balances Aronia.
- Optimal recipes balance **moderate Aronia** and **moderate-high Sugar**.

Conclusion

- **Aronia** strongly influences most sensory scores.
- **Sugar** enhances aftertaste and balances Aronia.
- Optimal recipes balance **moderate Aronia** and **moderate-high Sugar**.
- Findings guide future formulation of healthful, appealing Aronia jams.

Thank You

For questions or discussion: **maksudatoma@unl.edu**