NSW GOVERNMENT Department of Primary Industries

Australian Rice PARTNERSHIP

Quantitative Analysis of Cooked Rice Grain Texture

Yanco Rice Quality Team

Presented by

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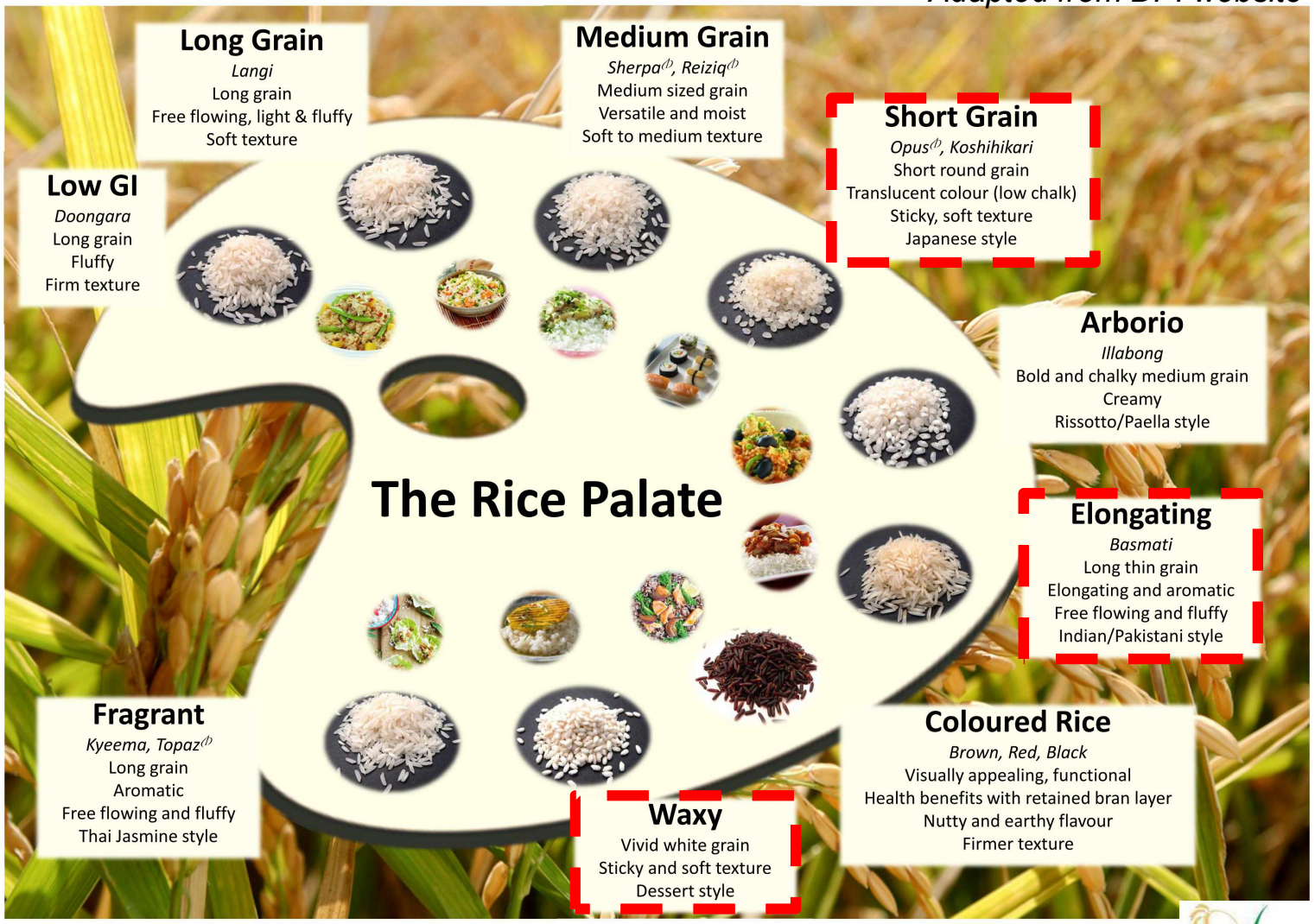
Introduction

Adapted from DPI website



Rice varieties with different quality and texture are used to make different type of foods

Introduction

Factors affecting cooked rice texture

- Amylose content
- Post-harvest processing
- Cooking methods
  - South and East Asians: rice cooker, particular water ratio
  - Indians: boiling in excess water
  - Americans: use large amount of water then drained

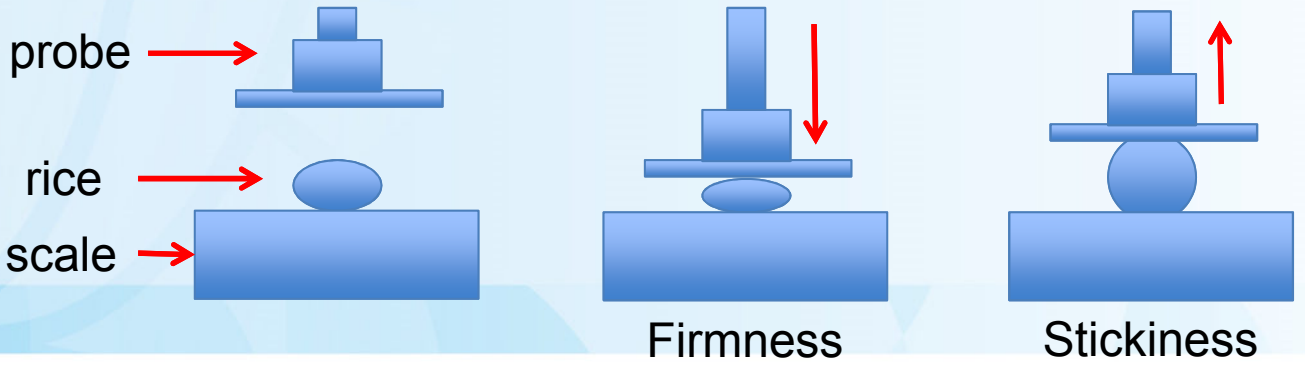
Current methods *(indirectly measures texture)*

- RVA (setback correlated with firmness)
- Gel texture analysis (gel firmness)

Introduction

Texture analysis

- Sensory panel
  - High cost for training and maintaining the panel
  - Not ideal for screening purpose
- Instrumental approach
  - Less cost and less time-consuming
    - Texture analyser
  - Mimic the first bite of a food sample



Aims of study

- Develop a method to directly measure cooked rice texture
- Compare textures of breeding lines and existing varieties
- Determine the contribution of different grain quality factors affecting the texture *(amylose content, gelatinisation temp, RVA parameters, etc.)*

Materials

30 varieties from Leeton farm, C2016

Selected based on

- Different grain dimensions
- Apparent amylose content 7~27 %
- Gelatinisation temp (GT) 65~79 ^{o}C
- Optimum cooking time 14~21 min

Method

Cooking method

Excess water method with

- Standard cooking time
- Standard water ratio

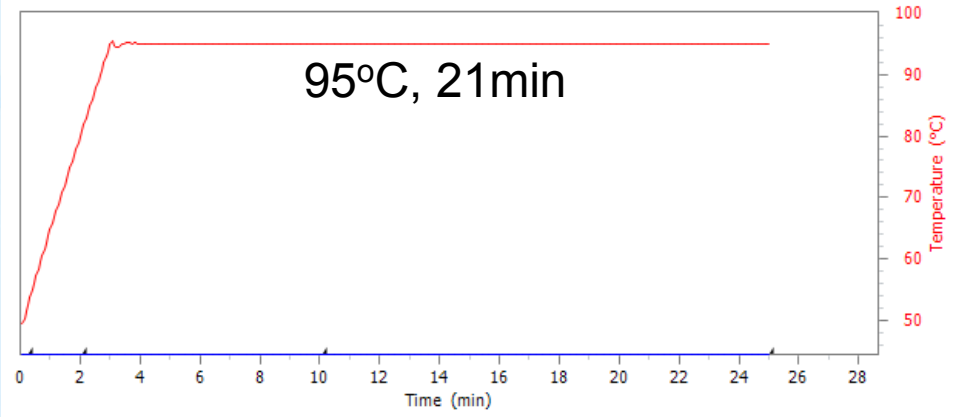
Instrumental texture analysis

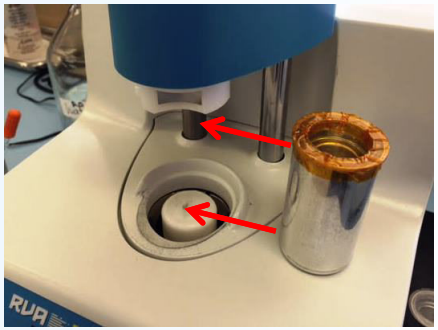
- Excess water drained after cooking
- Single layer cooked rice grains
- Two cycle compression

Method

Cooking in RVA

- 1g white rice contained in tea ball mesh and rinsed with tap water
- Add water up to 4g in a RVA can
- Seal the can with lid on using the thermo tape
- Load on to RVA machine
- Run the standard cooking profile





- Remove the lid after cooking to release the steam
- Replace with another lid at 1 min to keep it warm for 3 min on the bench

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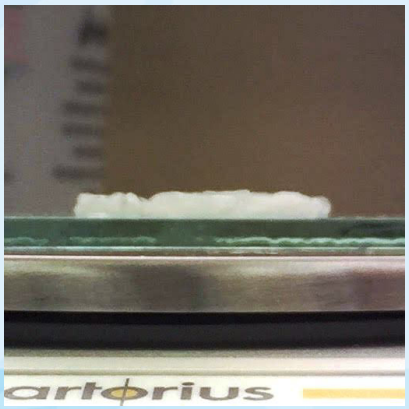
Method

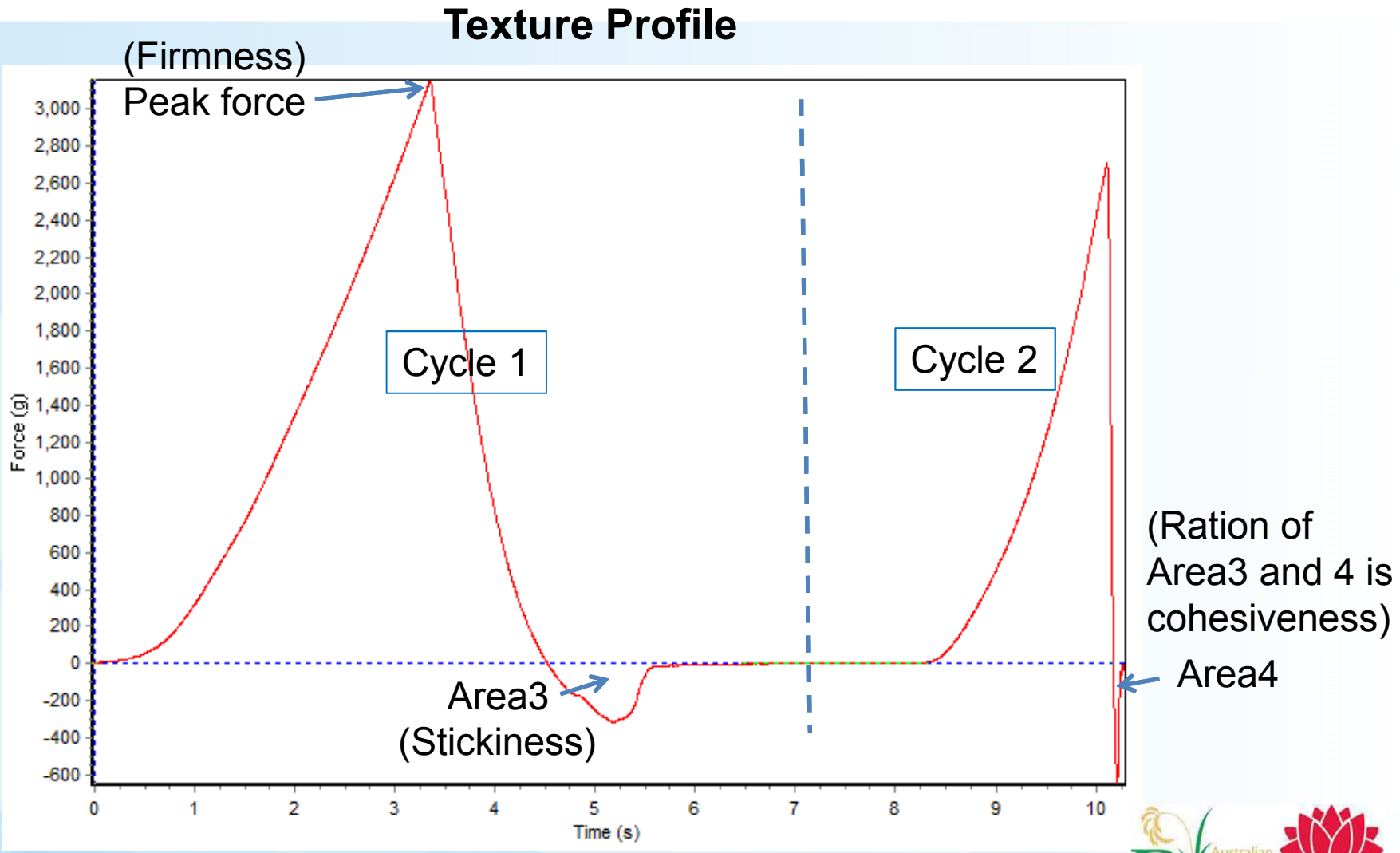
Texture Profile Analysis (TPA) using TXT



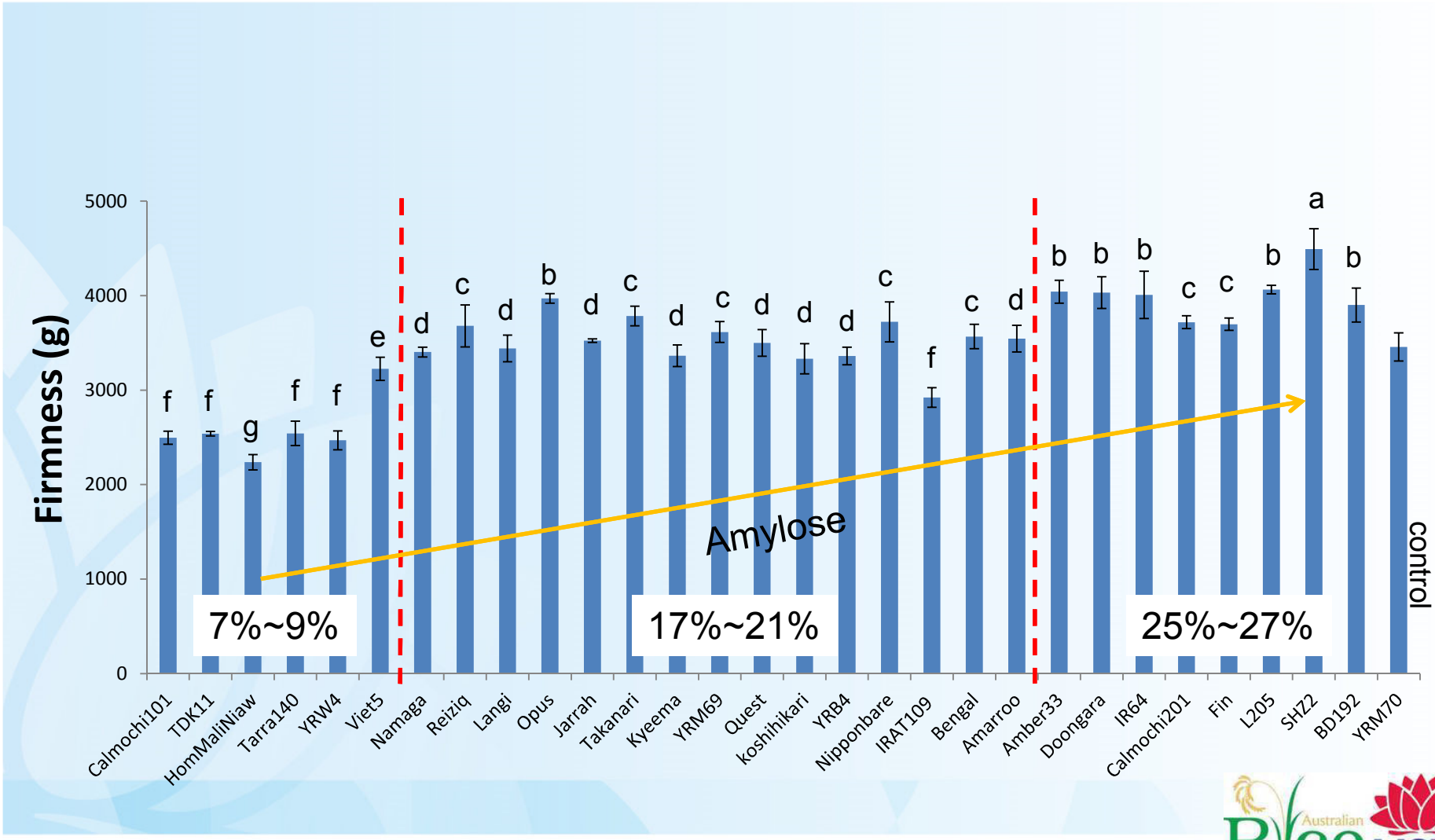
- Weigh and prepare 1g cooked rice sample within the mark on a glass plate in 1 min
- Run the standard test profile
  Two cycle compression,
  compress to 80% sample height

Technical tips:
Each single grain sits on its side and spread well. Sample height is negatively correlated with firmness for the same sample.

Results - theory



Results - Firmness



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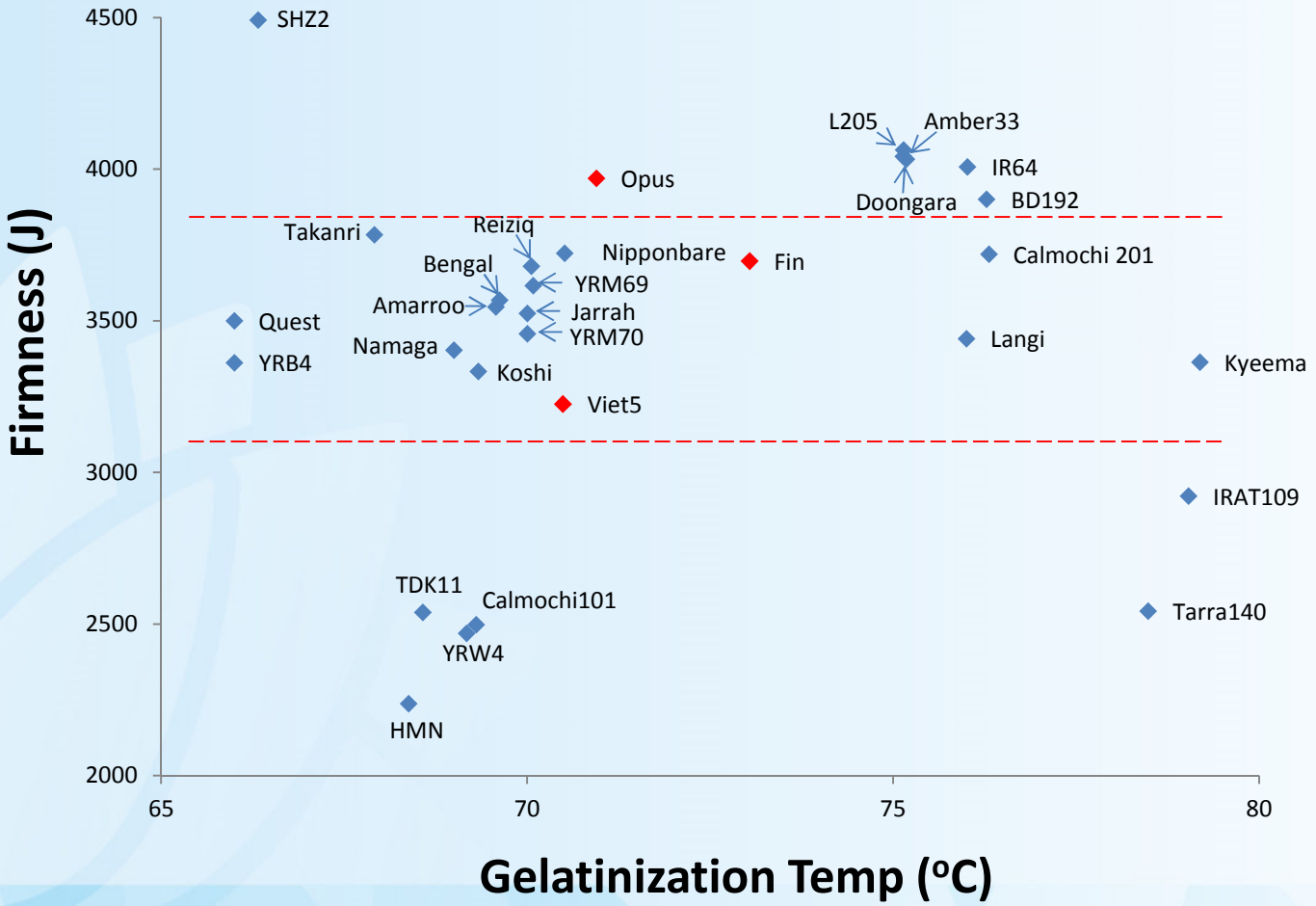


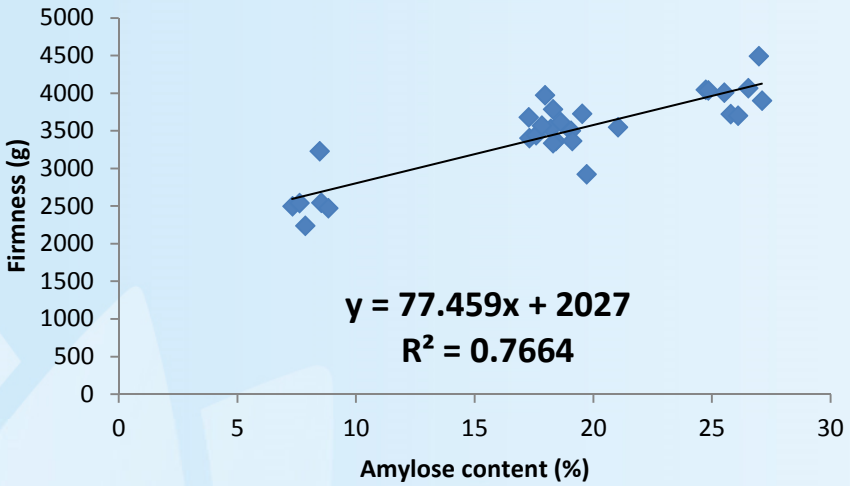
Amylose content

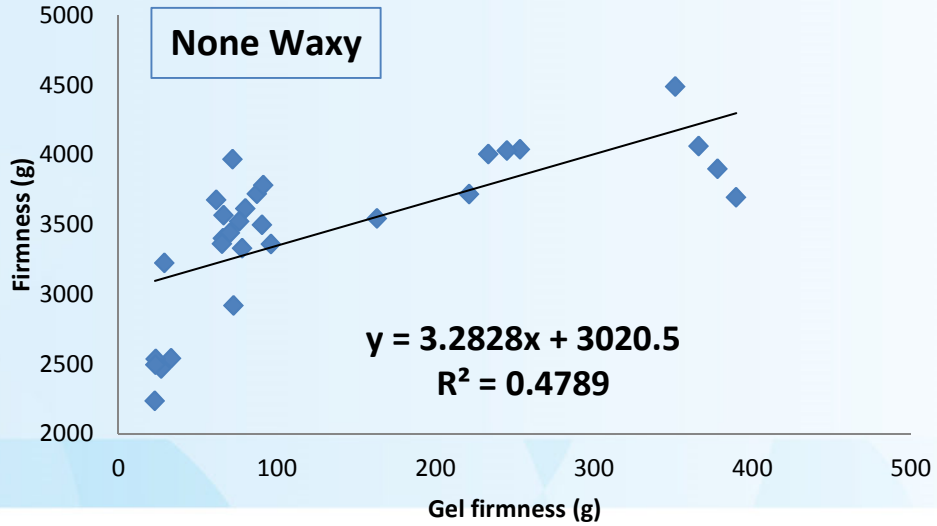
7%~9%

17%~21%

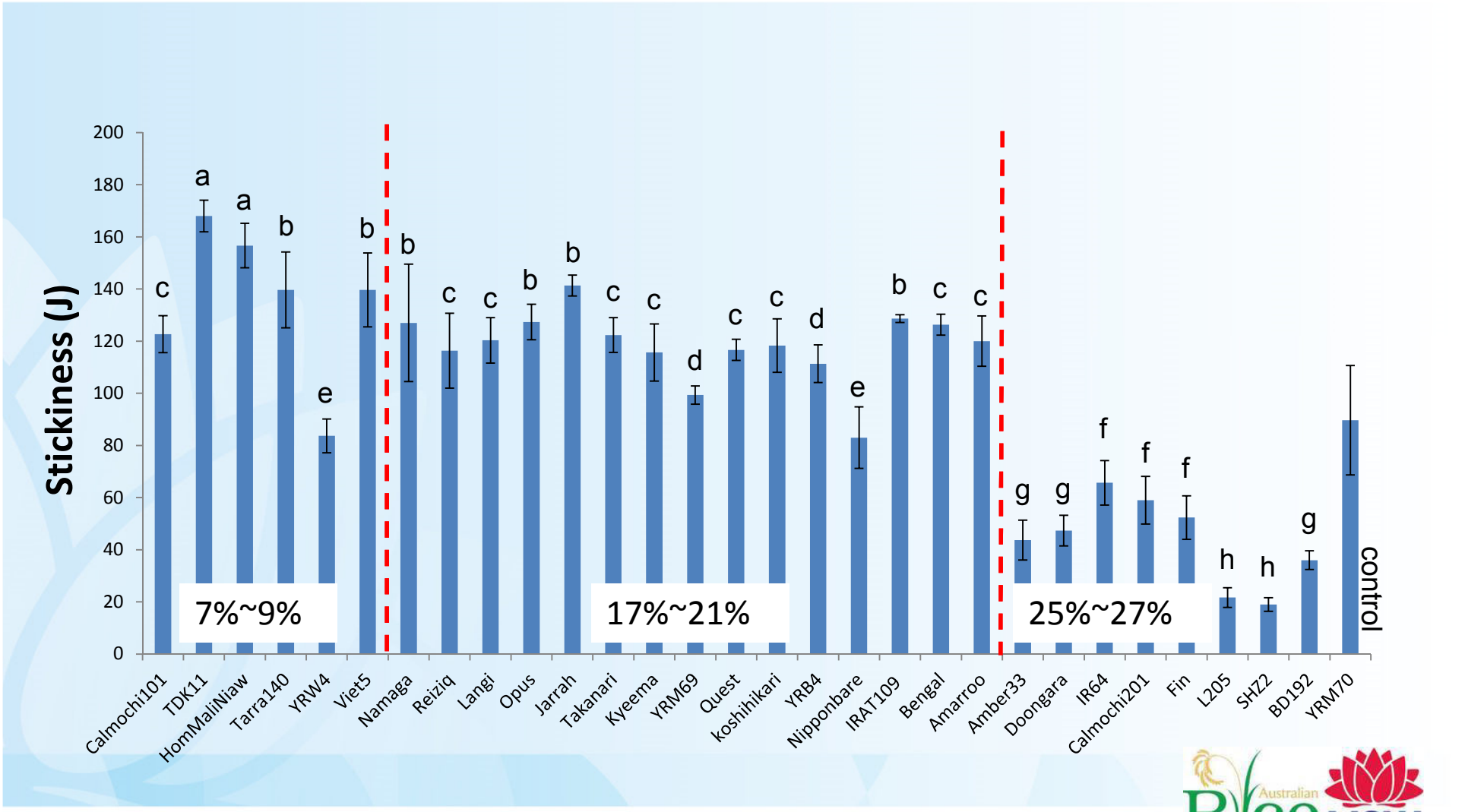
25%~27%

Results - Firmness





Results - Stickiness



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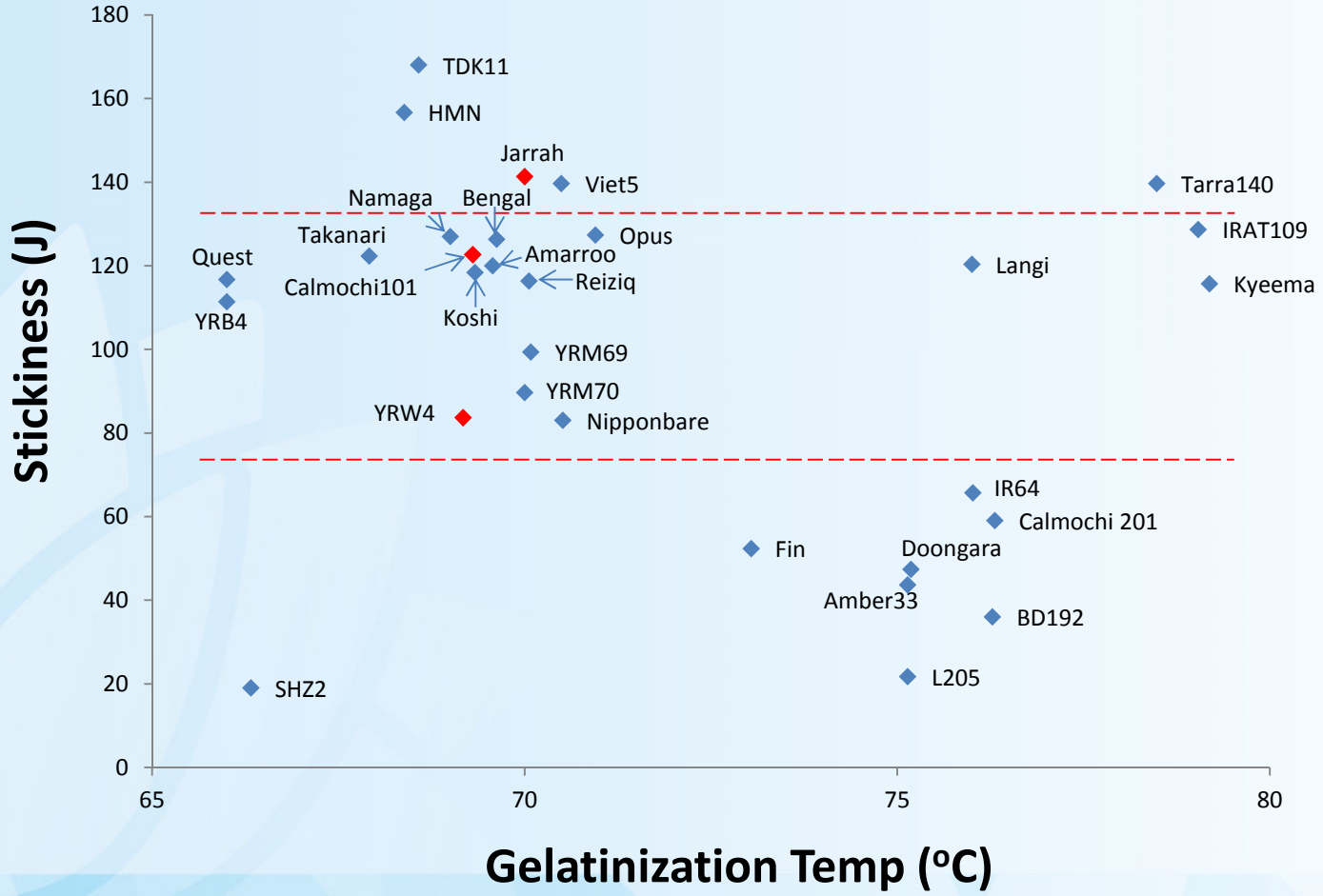

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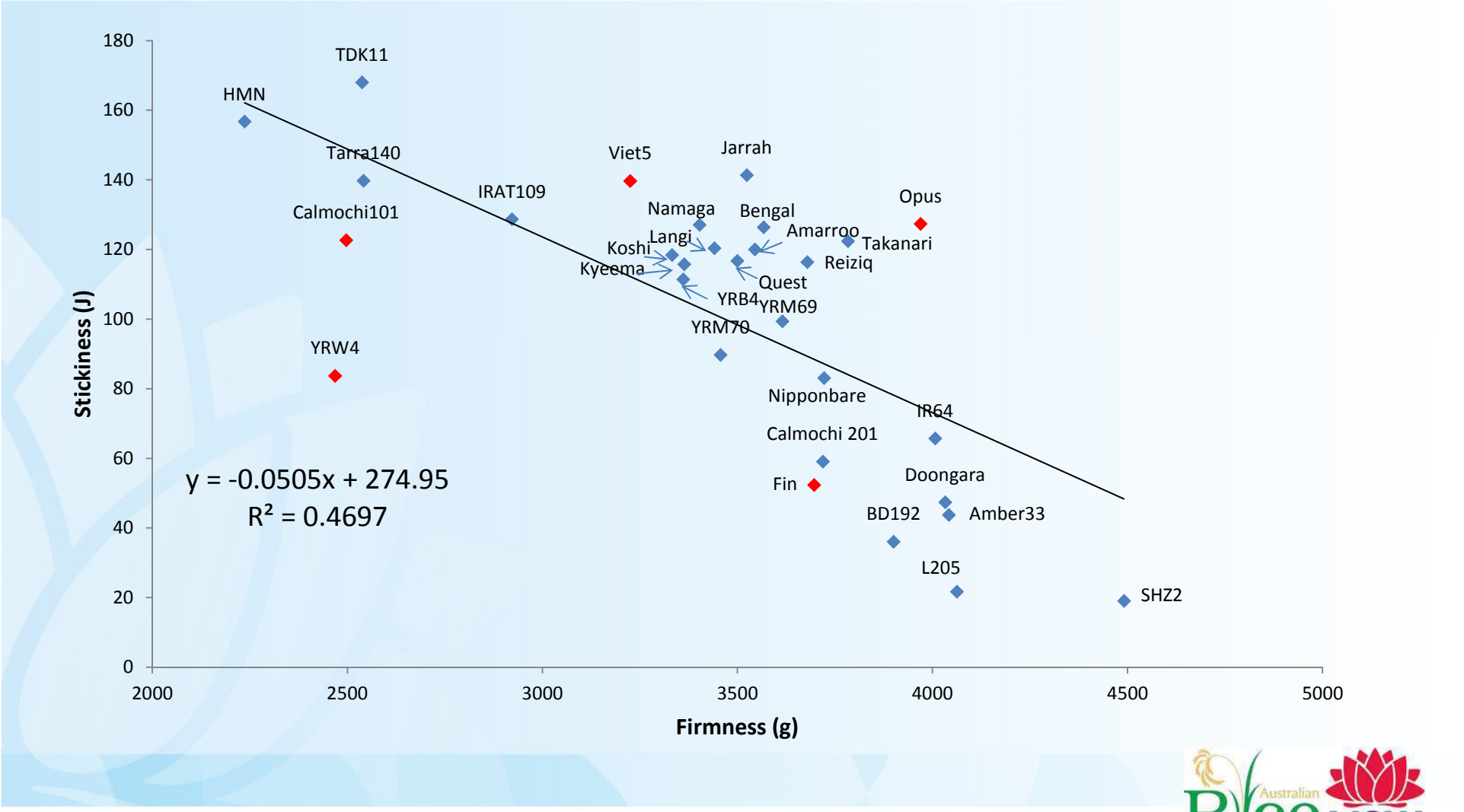

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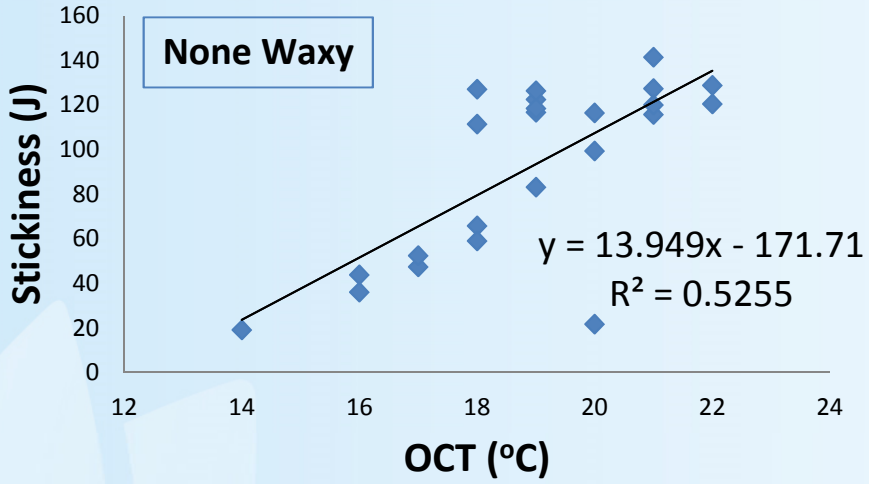

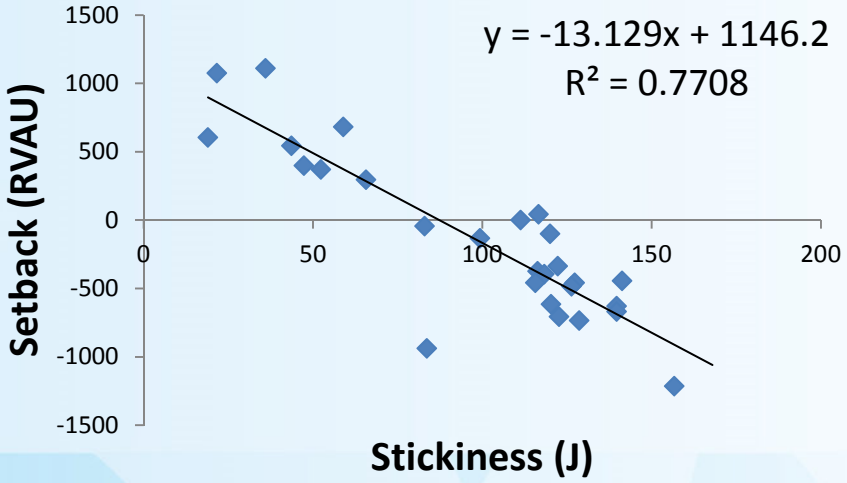

Summary

- Used TVT machine to measure texture directly
- Compared results to gel firmness
- Explored texture correlation with OCT, GT, RVA setback parameter
- The outlier varieties in the texture profile of each amylose group were found

Future work

- More quality data for covariant analysis
- Amylose & amylopectin structure analysis by CE/SEC
- Look at the outliers

Acknowledgement

Rice Quality Team:

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