



## Overcoming Pre-Harvest Sprout Damaged Malt: The effects of enzyme addition

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# Overview

- Challenge
- Approach
- Results
- Conclusions

# Challenge: 2014 Barley Crop



# Approach



# What can a Maltster do?



# Micro Malt

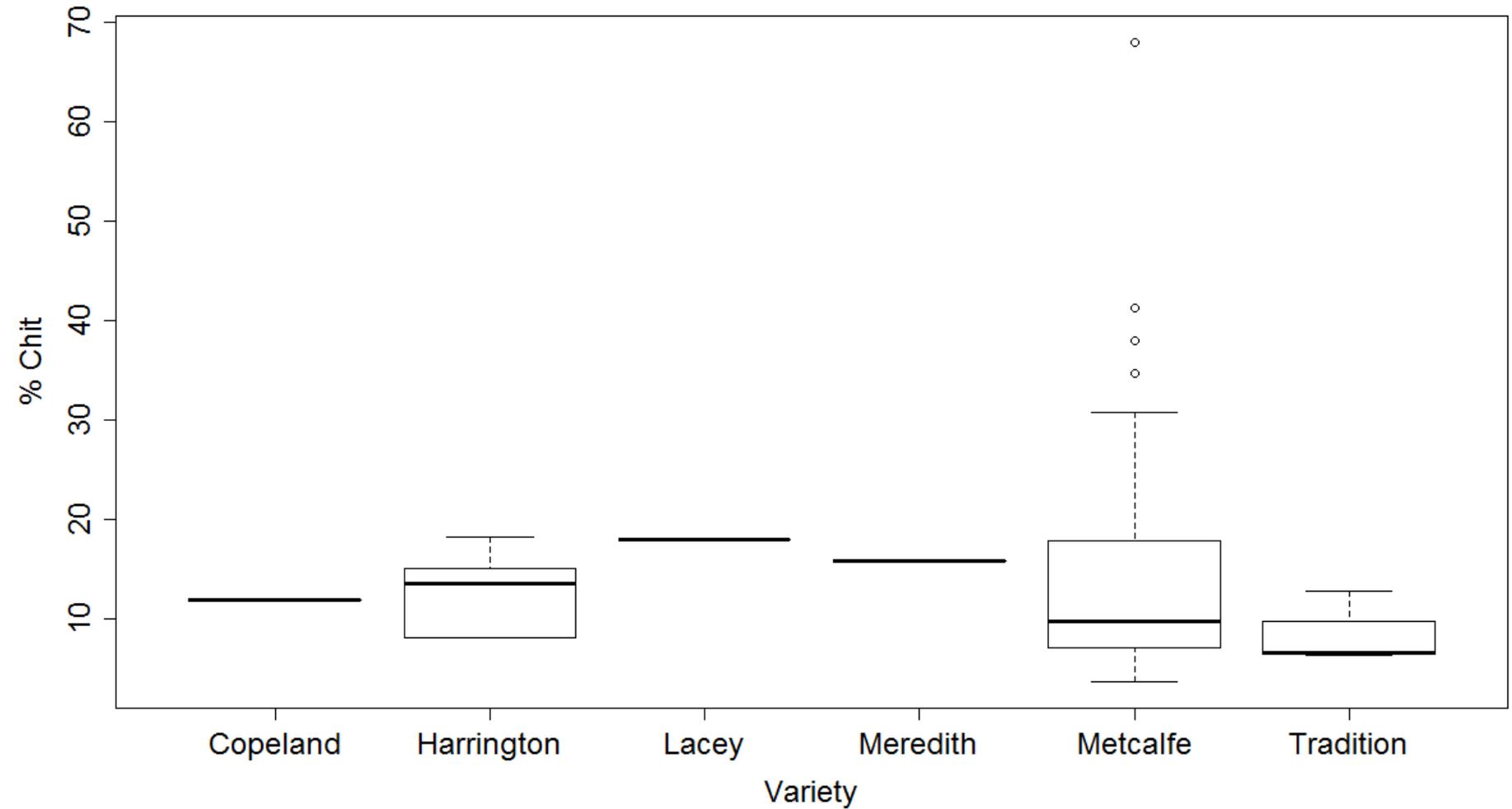
## Pre-Sprouted Barley Micro Malt Observations

# ZOMBIE KERNELS

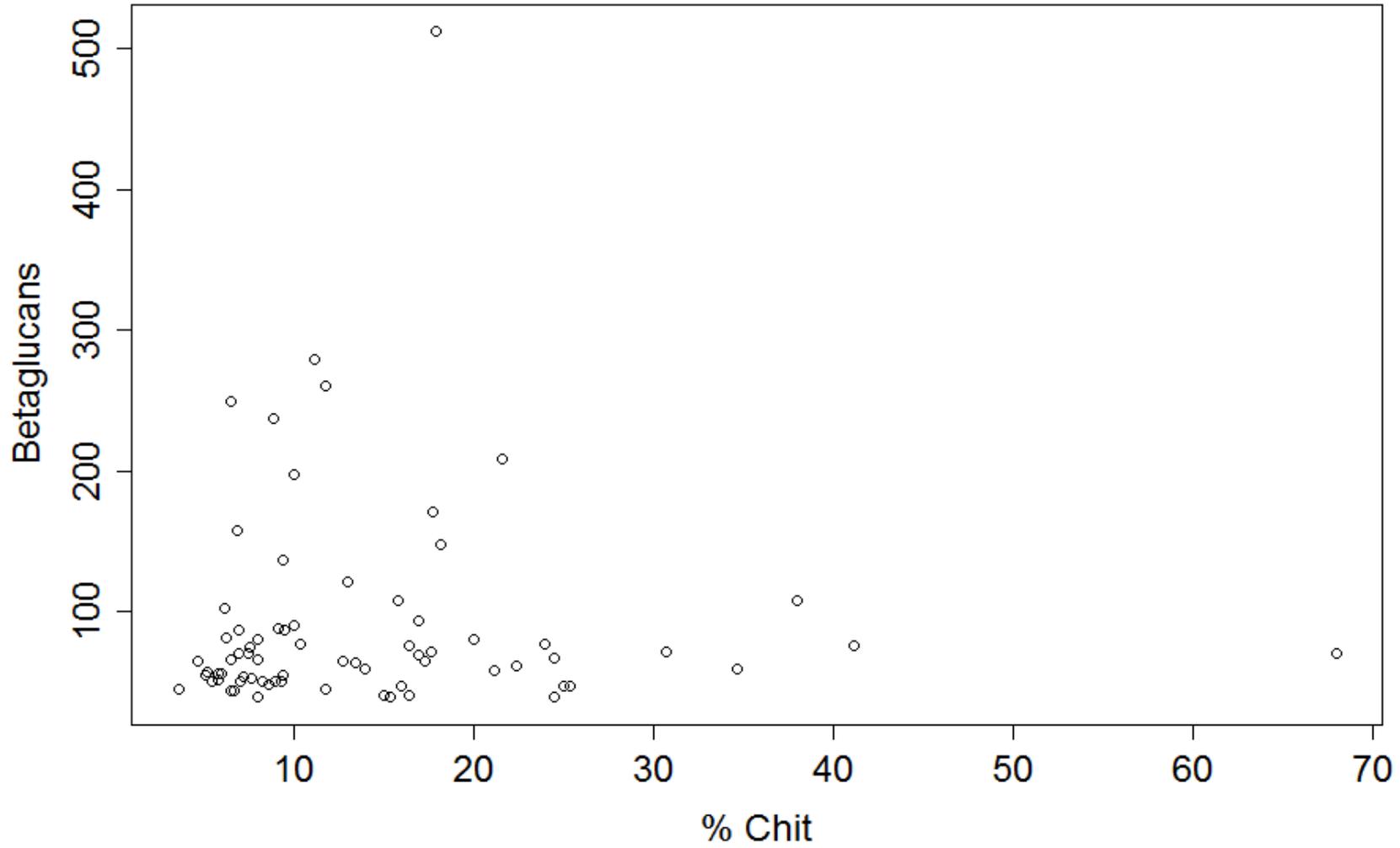
- Pre-sprout kernels **SWELLED**
- Inherent enzyme activity-not detectable
- Gibberillic Acid does not save dead kernels
- Exogeneous Beta-glucanases added during germination no effect
- *Variable* Growth



# Results



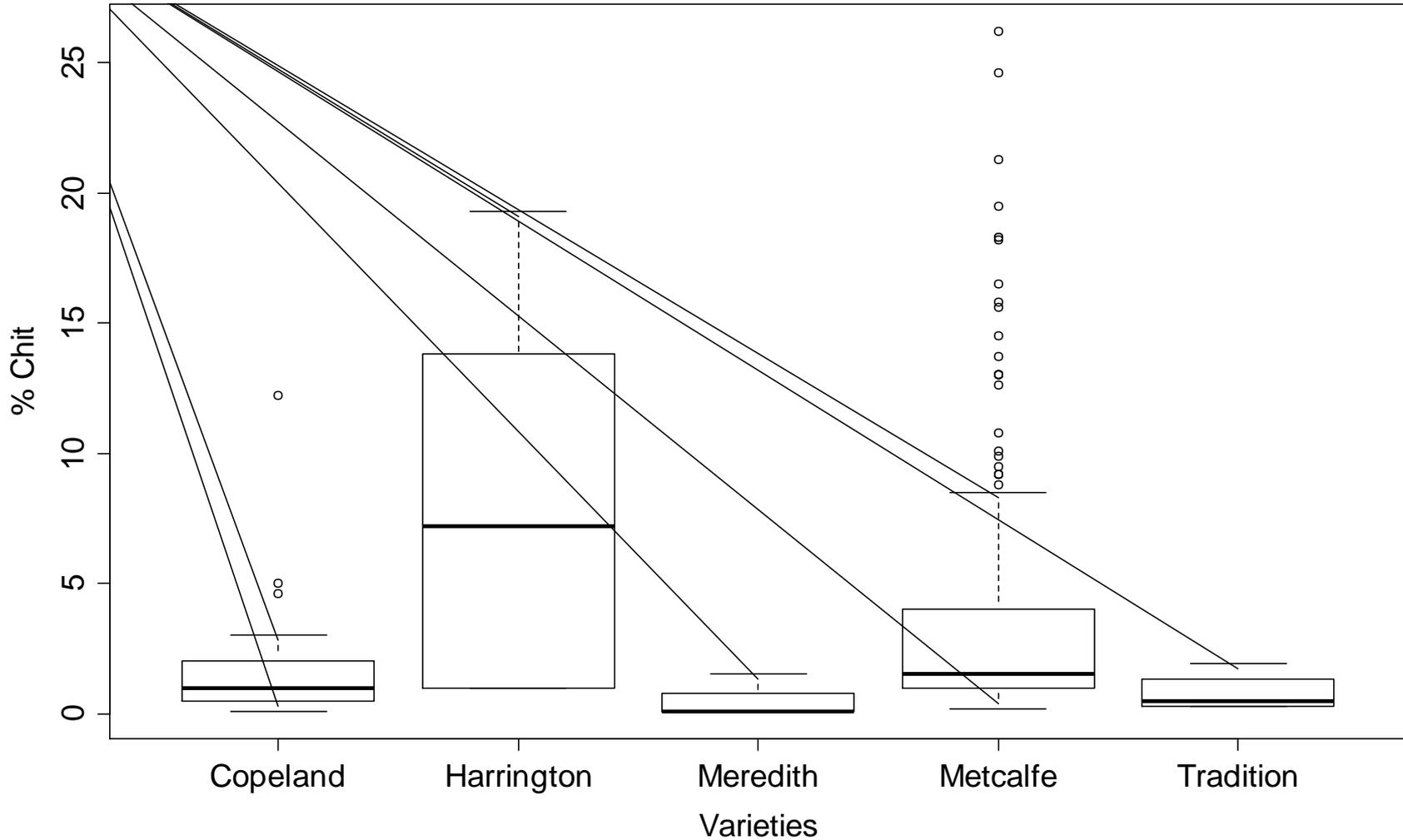
# Results



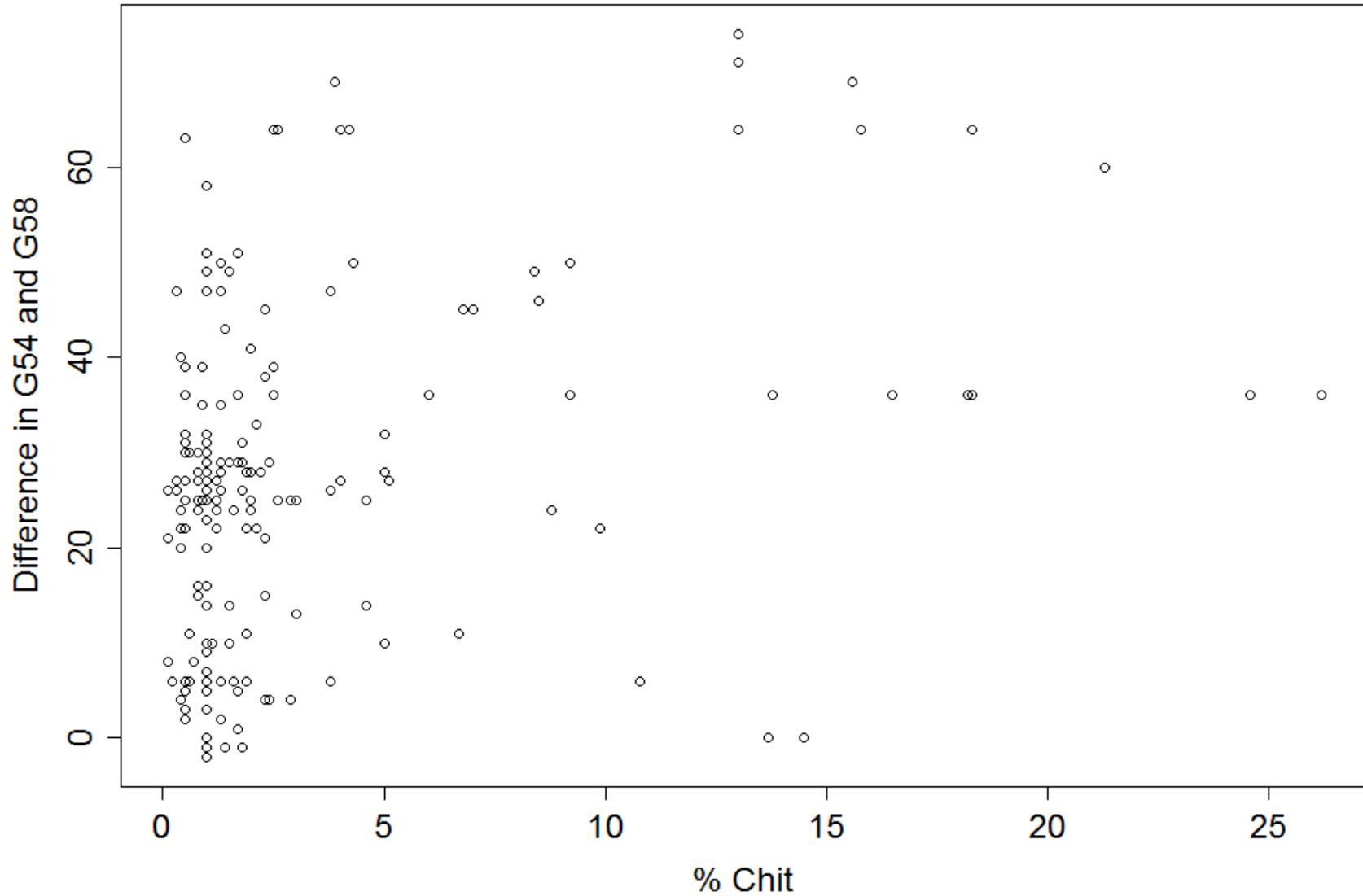
# Commercial Malting



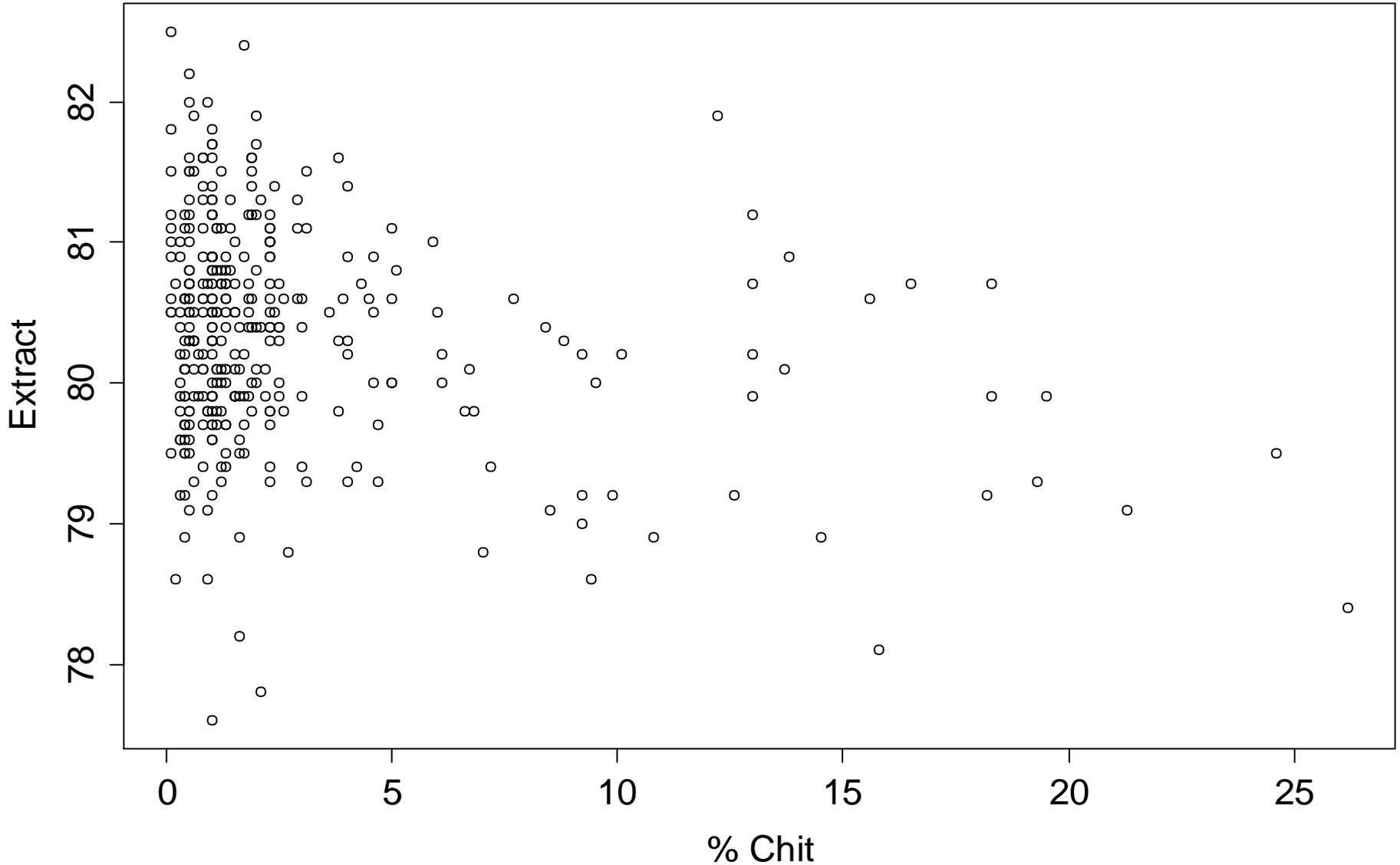
# Sprouted Barley: Chit Levels by Variety



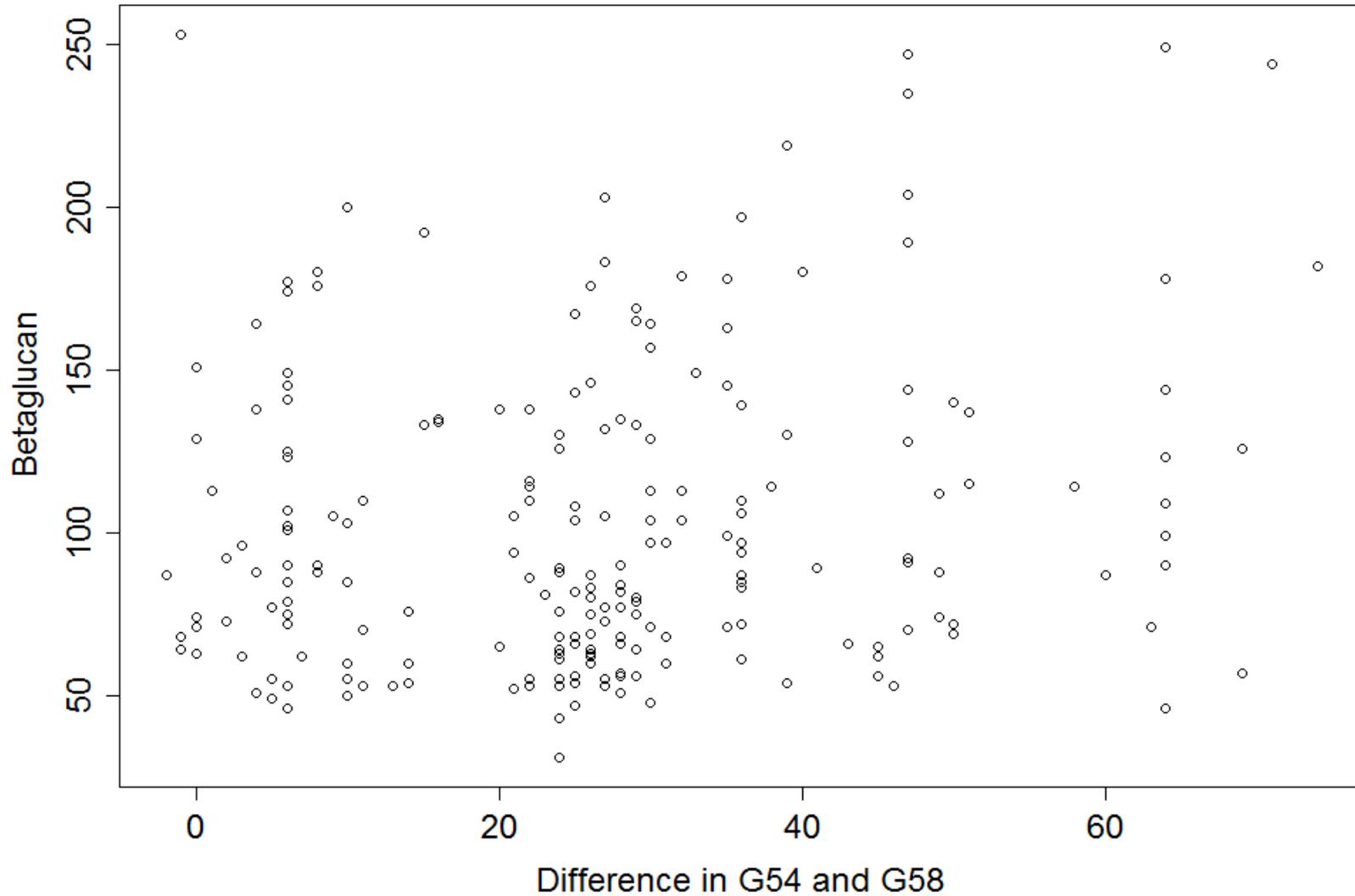
# Sprouted Barley: Water Sensitivity



# Sprouted Barley: Extract Affected by Chit Level

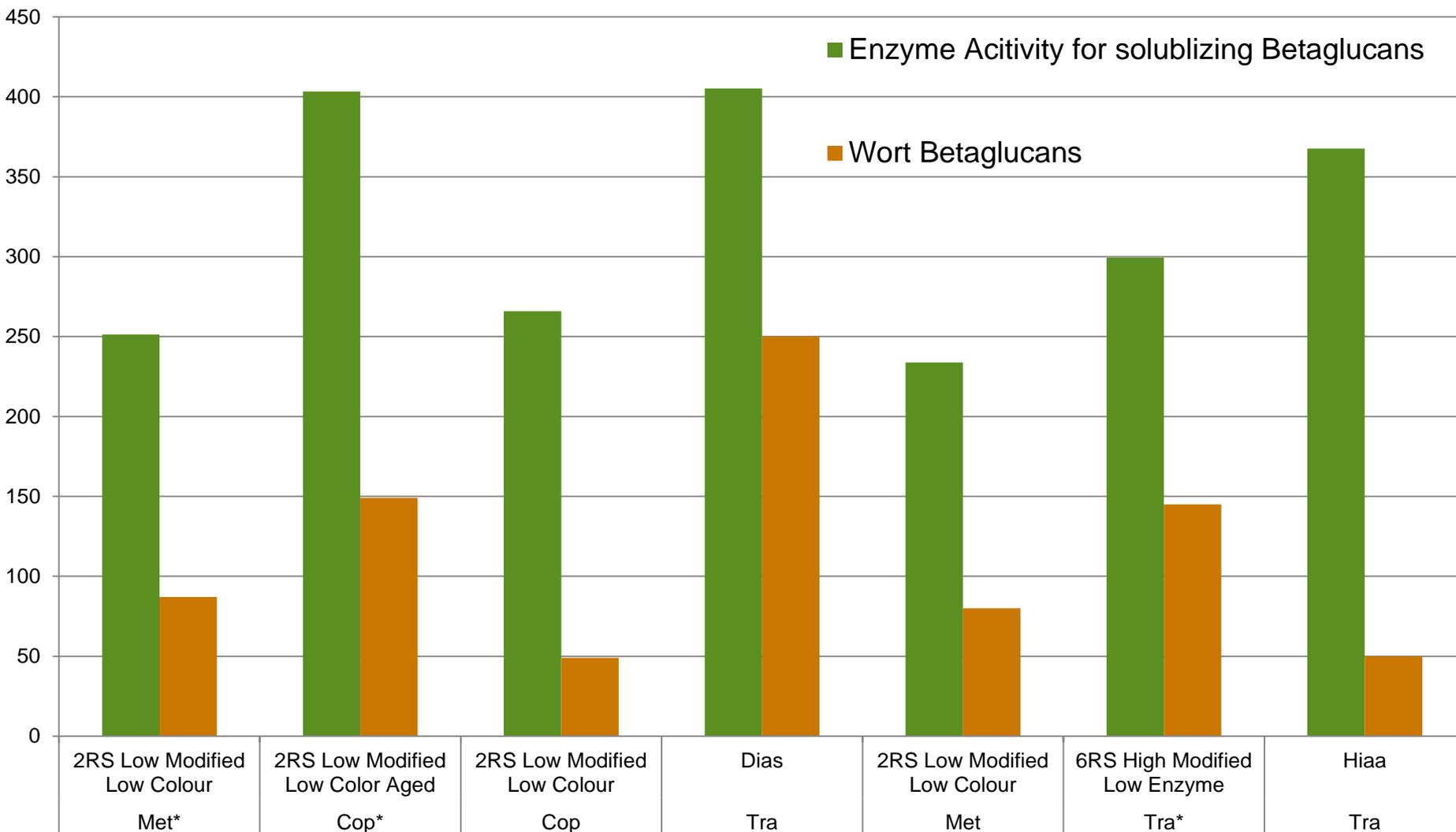


# Water Sensitivity Does Not Mean High Betaglucans

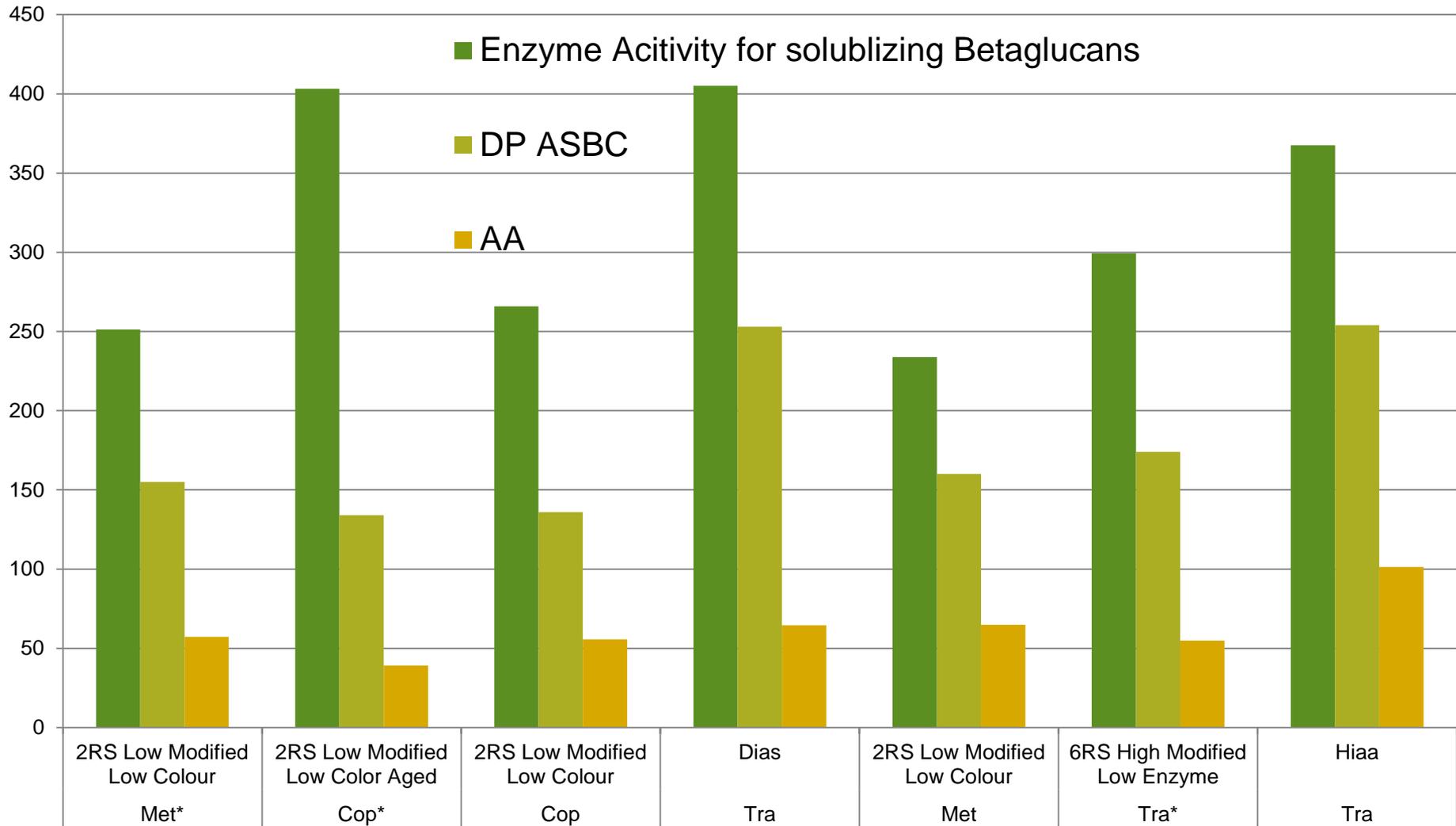


# Natural Enzyme Activity

# Enzymes Solubilizing Betaglucans vs Wort Betaglucans



# Enzymes Solubilizing Betaglucans vs. DP & Alpha Amylase



# Enzyme Addition

# Pre-Sprout Damaged Malt with Enzyme Addition to Mash

Variety	Chit Level	Enzyme	Percent Change in Wort		
			<i>Betaglucans</i>	<i>Viscosity</i>	<i>Extract</i>
Lacey	17.9%	4G &ANP	-92%	-30%	1%
	17.9%	AP3	-86%	-28%	1.3%
Tradition	9.5%	4G &ANP	-92%	-63%	9.3%
	9.5%	AP3	-67%	-64%	7.3%
Harrington	20%	4G	-88%	-25%	No Change
Metcalfe	32.4%	4G	-94%	-63%	6.7%

# Natural Betaglucanase Supplementation Distillers Malt

Distillers Inclusion of Grain Bill	Metcalfe with Chit:9.5%
	Betaglucan Reduction
0%	0%
5%	2%
15%	11%
30%	23%

# Conclusions



# Thanks

- Sarah Kelley, Senior Food Safety and Quality Technician
- NA Malt Quality Lab

The logo features a green, curved shape resembling a leaf or a drop above the word "Cargill".

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