

# OPTIMIZING YOUR GRAPES POTENTIAL. Tools for Harvest 2011

Southern Oregon Wine Institute

July 20<sup>th</sup>, 2011

Dr. Nichola Hall

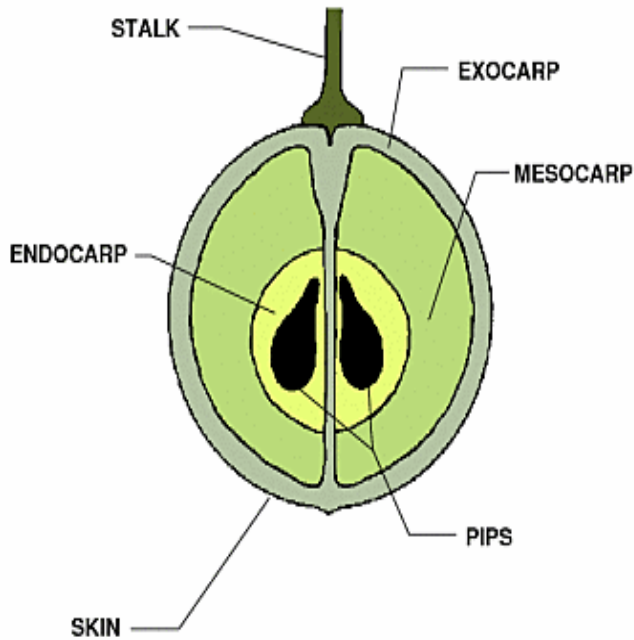


# OUTLINE-OPTIMIZING POTENTIAL

- Grape quality and enzyme use
- Tannin options for all winemaking stages
- Yeast strain choices for successful fermentations
- Yeast Nutrition decisions for enhanced aromatics

# GRAPE STRUCTURE

# THE BERRY



## Skin

### 8-20% Berry Weight

Contains: Color pigments, tannins, aroma and aroma pre-cursors, pectin (~30%), cellulose, citric acid, cinnamic acids & microbes

## Pulp

### 75-85% Berry Weight

25 layers in 3 zones

Contains: Pectin, cellulose, hemi-cellulose, acids, sugars, Nitrogen and minerals

## Seeds

### 0-6% Berry Weight

Ideally, 4 seeds

Contains: Carbohydrates, tannins, nitrogen and minerals

Tannins 20-55% of total phenolic content of grape

# THE INFLUENCE OF ENZYME PREPARATIONS



# ENZYMES FOR WHITES/ROSES

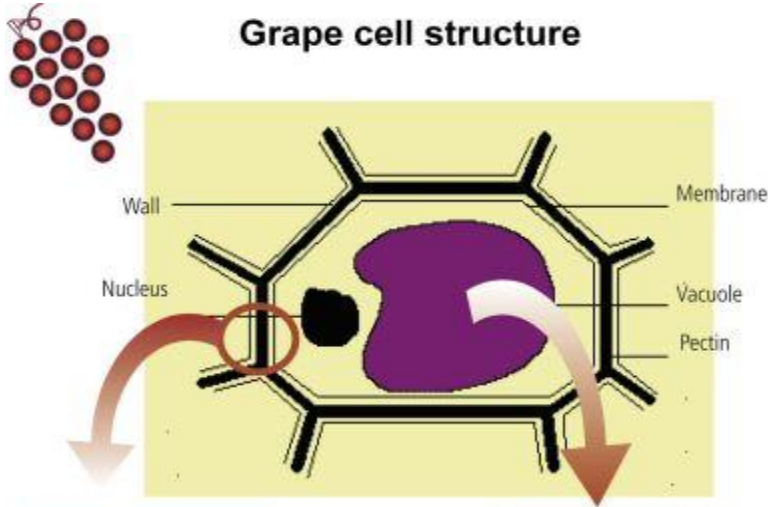
- Skin contact enzymes- release aromas and pre-cursors
- Clarification
  - Break down pectin quickly and efficiently
  - Increase yields

# ENZYMES FOR REDS

- Maceration/Extraction Enzymes
- Direct hydrolysis of Polysaccharides
  - Early (greater) release of stable macromolecules in the colloidal network
    - more interesting interactions with ripe aromas
  - Early liberation of sensory interesting “free or hydrophilic” tannins

# GRAPE CELL WALL STRUCTURE

Grape cell structure



Cell wall  
Physical barrier

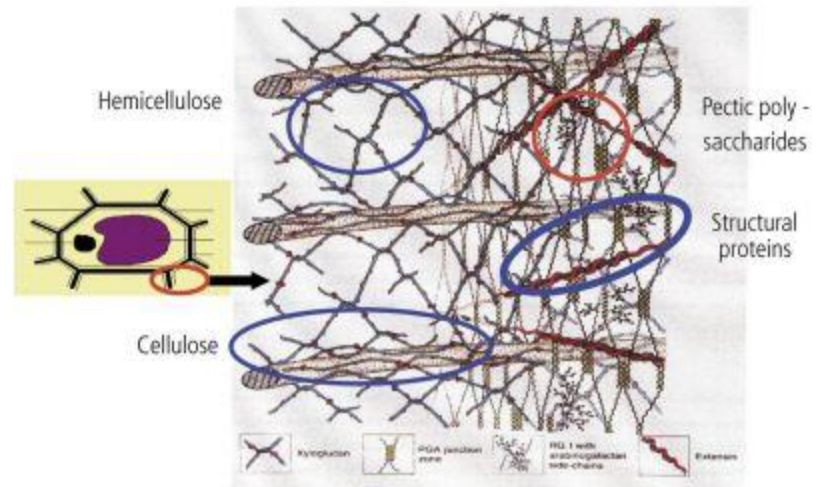
Anthocyanins  
Tannins

Sugars & Acids

## Primary wall-

Composed of Polysaccharides-Pectin, Hemi-cellulose, Cellulose & Proteins

Grape primary cell wall



# GRAPE POMACE



Without Enzymes



With Enzymes

# ENZYMES-

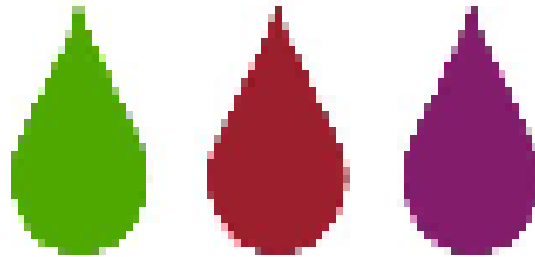
## REVEAL THE POTENTIAL OF THE GRAPE!

- Reds
  - Enhance mouthfeel and fruit
  - Improve tannin structure
  - Color stability
  - Increase yields
- Whites/Roses
  - Enhance aromatic expression and fruit
  - Enhance mouthfeel
  - Increase yields
  - Clarification

Enzyme use also means that you can press gentler using lower pressures and shorter cycles.

## ENOLOGICAL TANNINS

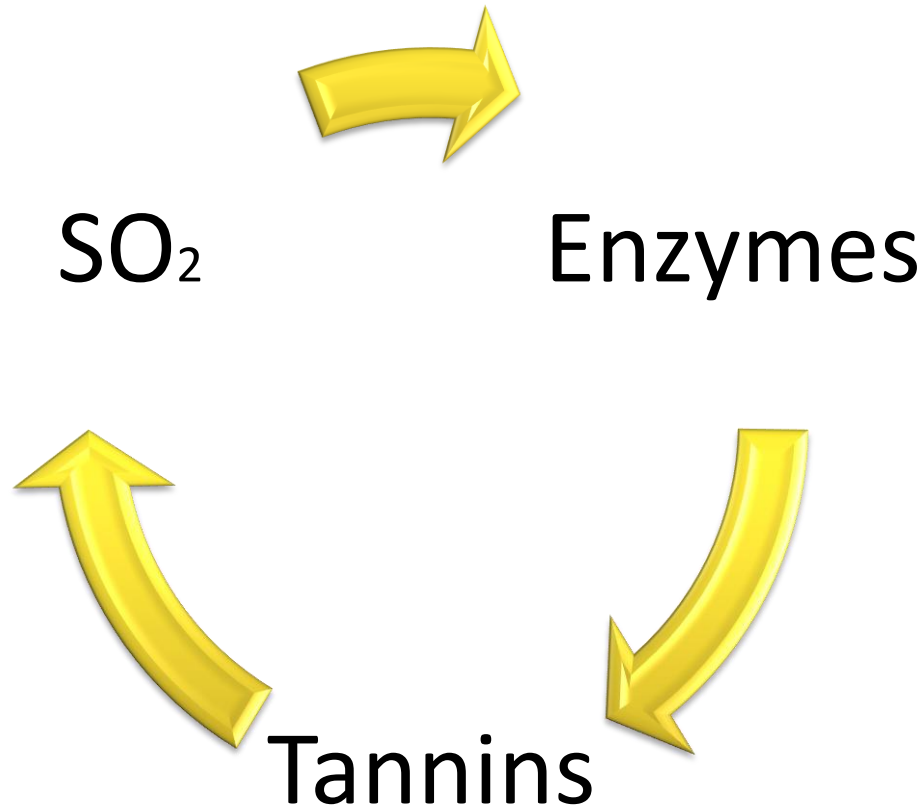
# SCOTT'TAN



# ENOLOGICAL TANNIN APPLICATION

- Anti-oxidants
  - Oak and Chestnut
- Optimizing and stabilizing color
  - Quebracho and Grape
- Protein “stabilization”
  - Quebracho and Grape
- Assisting with mouthfeel, structure and balance
  - Gall nut, Tara, Oak and Grape
- Aromatic enhancement
  - Oak
- Enhances Aging Potential

# ENOLOGICAL PRODUCT INTERACTIONS



# OPTIMIZING AND MANAGING YOUR FERMENTATIONS



# YEAST STRAIN CHOICE

- Match your analysis to your strain choice

Strain	Alc. tolerance	Temperature range	Key Nutrient requirements	Fermentation Speed	Sensory Effect
A	16%	64-86	Med	Mod	EVC
B	14%	59-68	Low	Mod	Esters

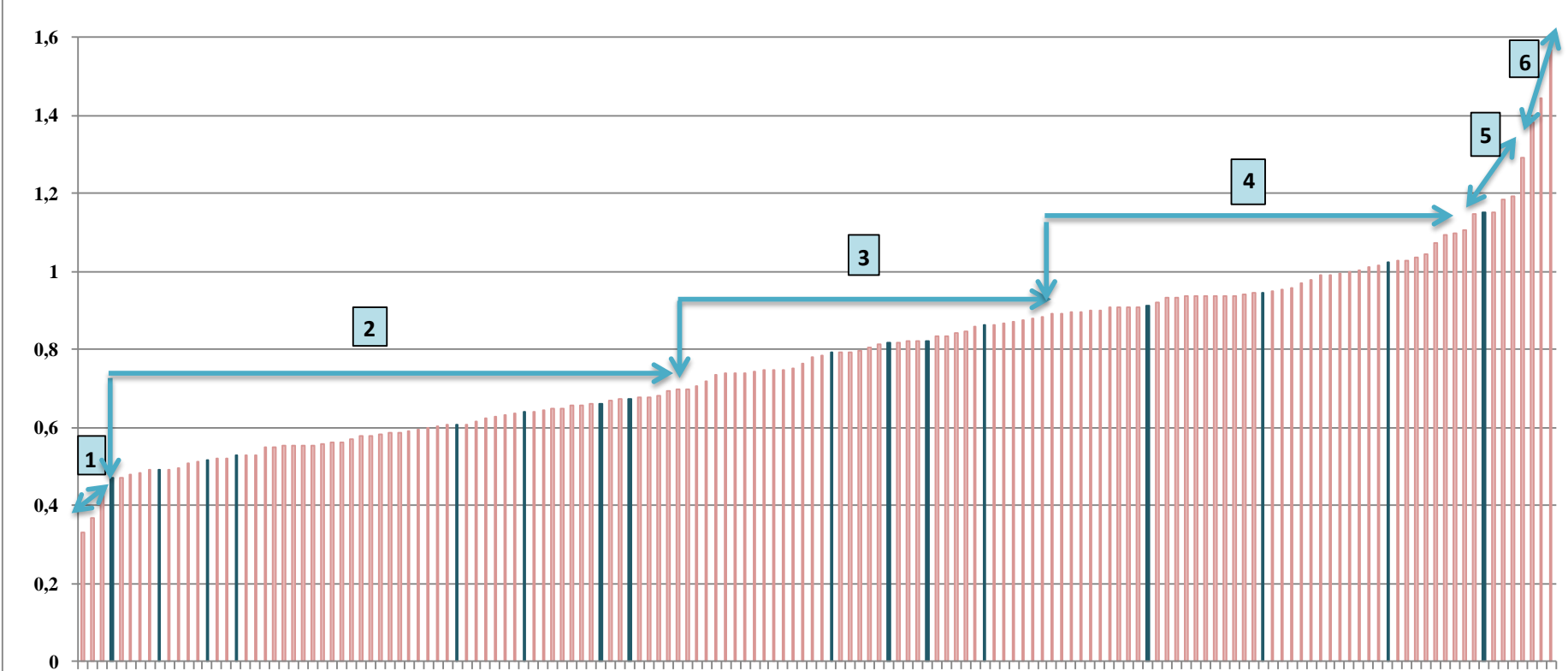
- Environmental conditions before reputed sensory contributions

# YEAST NITROGEN REQUIREMENTS

- Classified as:
  - Low
  - Medium
  - High

Different suppliers use variations of this system ...

# Nitrogen requirements : mg of YAN necessary to consume 1g of sugar



High variability among wine yeasts



# CHOOSING STRAINS FOR SUCCESS

- If you have a Low YAN situation, do not choose a high N requiring strain.
  - Higher rate of success
  - Minimizes nutrient additions
  - Less sensory deviations
  - Controlled (successful alcoholic)fermentation
    - Relates to an easier MLF
      - Inter-related!

# CELL NUMBERS AND HEALTH

- 2#/1000 gals (24° Brix or less)
  - 3-4 million cells/mL
  - Reach maximum cell density faster (grape juice is colonized when 100 million cell mL reached)
    - Lowers osmotic shock potential
    - Lower volatile acidity
    - Shorter fermentation length
    - Faster onset of fermentation
    - Lowers the dilution effect of yeast survival factors
    - Lower final residual sugar
  - But, Acclimatization is the key!



# YEAST STRAIN ACCLIMATIZATION

- Step 1- Rehydration
  - Rehydrate ADWY in chlorine free water @ 95-104°F
  - Stir gently
  - Leave for 15 minutes
    - Foaming is not an indicator of viability
- Step 2- Acclimatization
  - Gently add some juice/must to rehydrated yeast
  - Drop temperature 15°F and hold for 15 minutes
  - Repeat until within 15°F of juice/must to be inoculated
- Consequences?

# Temperature Control in Red Must



## Max. Temperature

- 20 Brix • 95°F
- 21 Brix • 90°F
- 22 Brix • 85°F
- 23 Brix • 80°F
- >24 Brix • 76°F

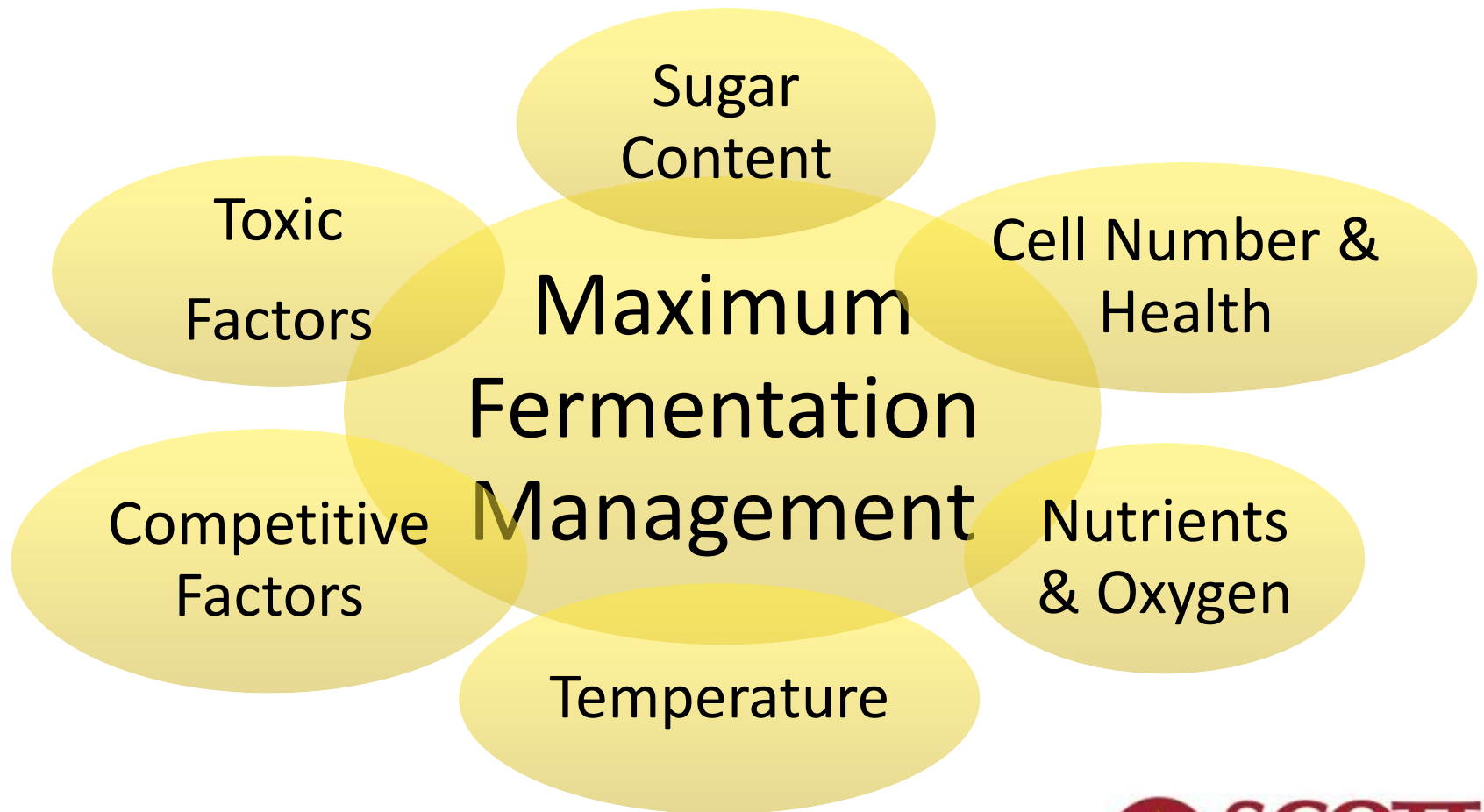
Aerate: when cap forms and 1/3 way through fermentation

Keep your yeast in suspension- especially at the end of fermentation

# ALCOHOLIC FERMENTATION MANAGEMENT- WHITES

- Whites
  - Turbidity (80 -100ntu-lower range)
  - Aeration
    - At 2-3 brix drop and 1/3 way through fermentation
  - Watch your temperature (<68°F)
  - Move your yeast
    - Especially at the end of fermentation

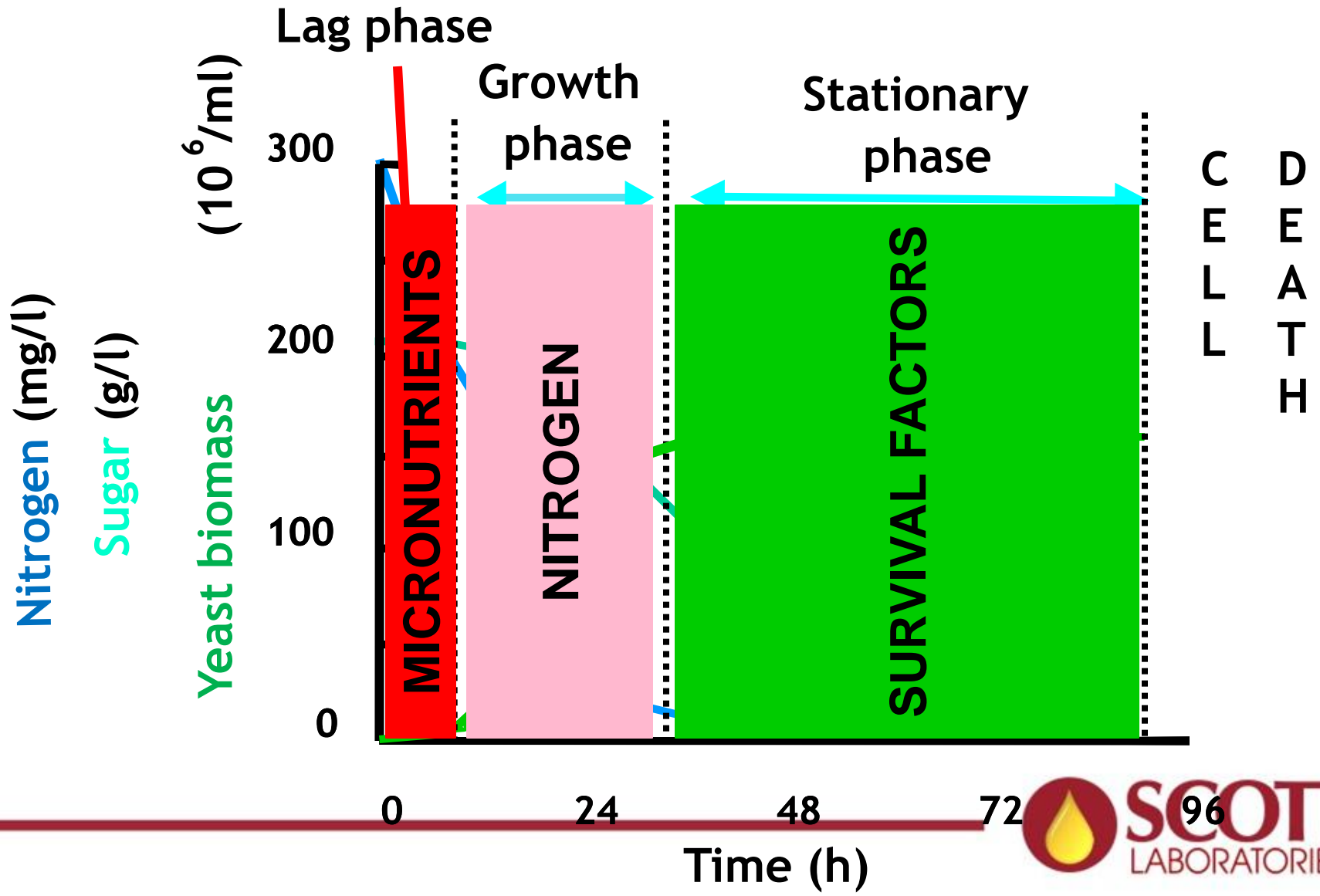
# FERMENTATION MANAGEMENT- KEY FACTORS



# **YEAST NUTRIENT DECISIONS FOR ENHANCED FERMENTATION PERFORMANCE AND AROMATICS**



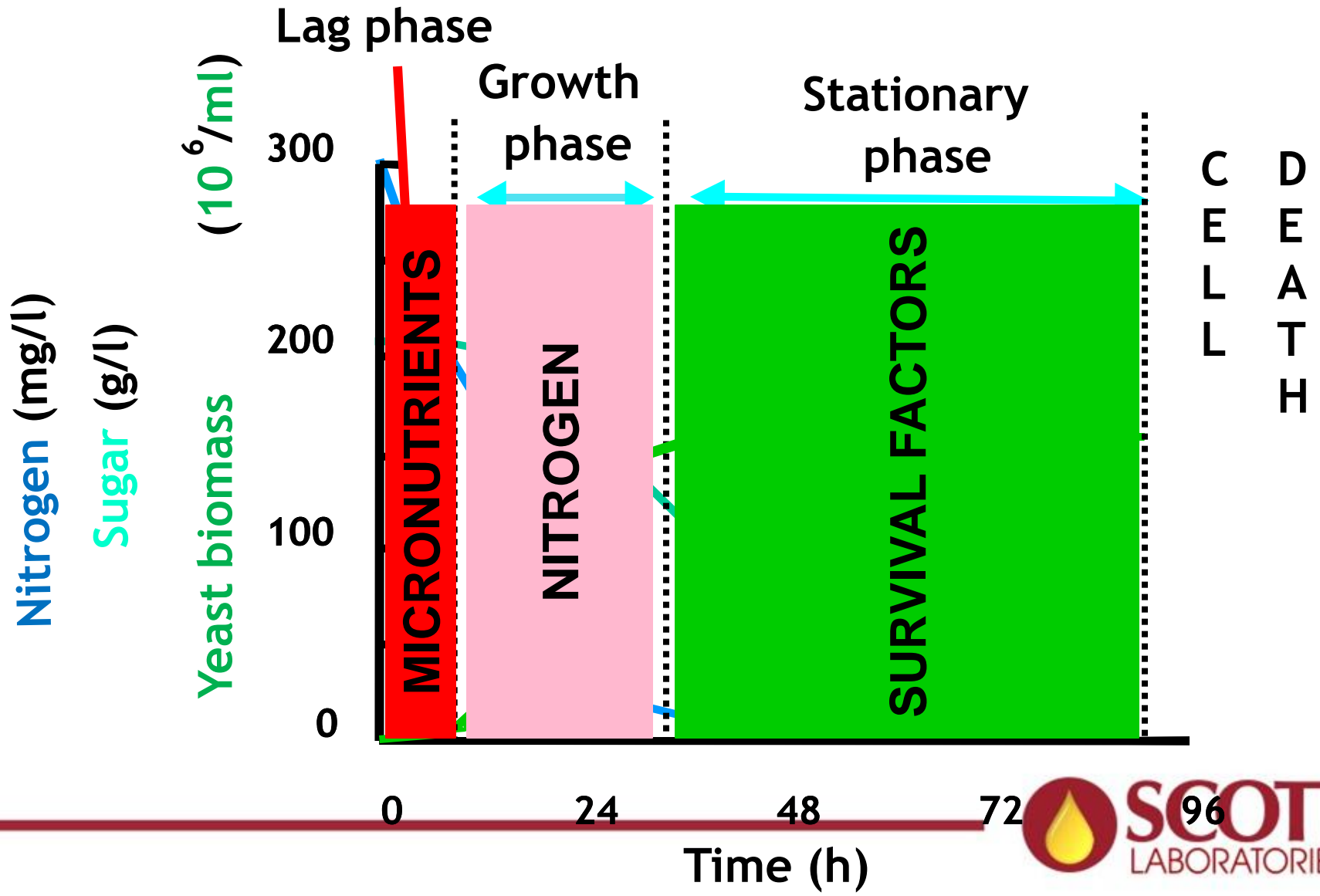
# ALCOHOLIC FERMENTATION: 3 STAGES



# NITROGEN

- 3 levels
  - **Low <150ppm (deficient)**
  - Medium (150 – 250 ppm)
  - High (>250 ppm)
- Is there a relationship between low N and other essential nutrients?

# ALCOHOLIC FERMENTATION: 3 STAGES



# YEAST NITROGEN SOURCES

Inorganic Nitrogen

-Ammonia Salts

Blends of Inorganic and Organic Nitrogen

- Fermentation

Organic Nitrogen

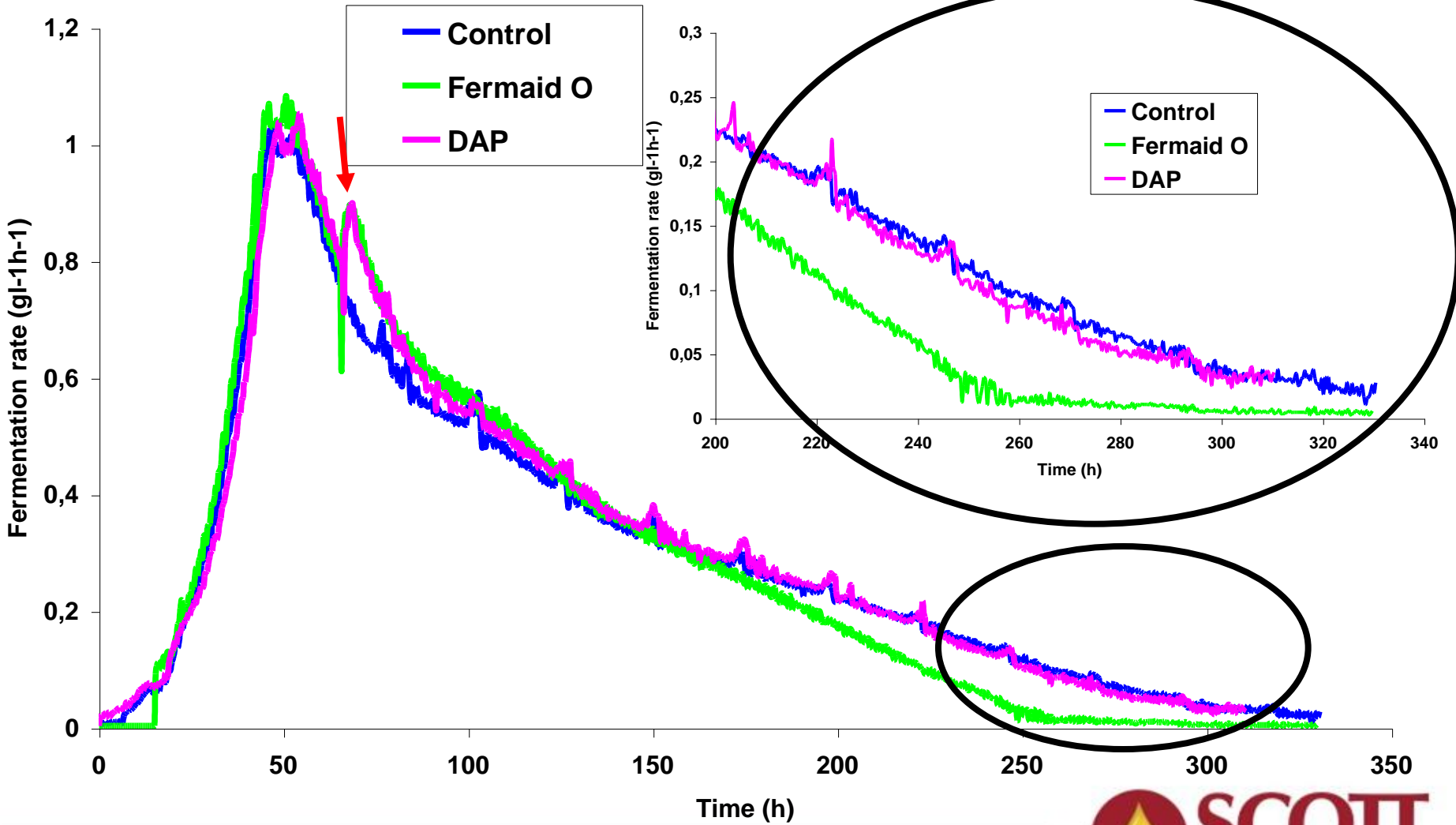
-Rehydration and fermentation

# NUTRIENT CONSIDERATIONS- YEAST PERSPECTIVE

- Original levels
  - Availability
    - Initial sugar concentrations
    - Ratio of ammonia : amino acids
    - Demands of individual yeast strain
    - Temperature
    - Oxygen levels
    - Timing of additions
    - pH
    - SO<sub>2</sub> levels
    - Health of grapes/level of indigenous flora
-

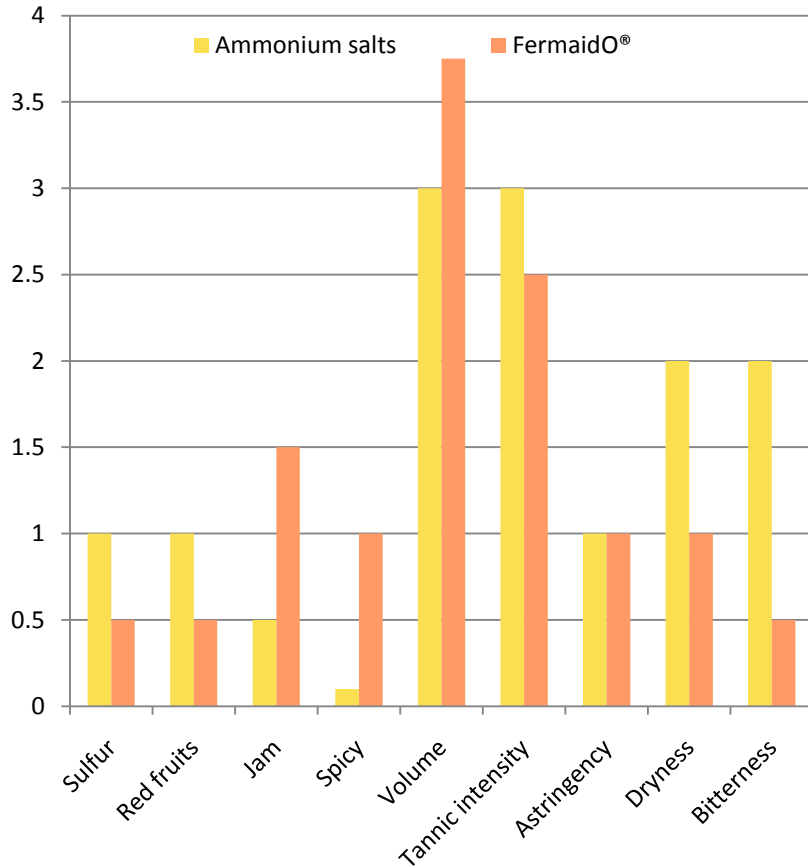
# QUALITY OF NITROGEN ON FERMENTATION PERFORMANCE

(INRA pilot scale trial:100L)

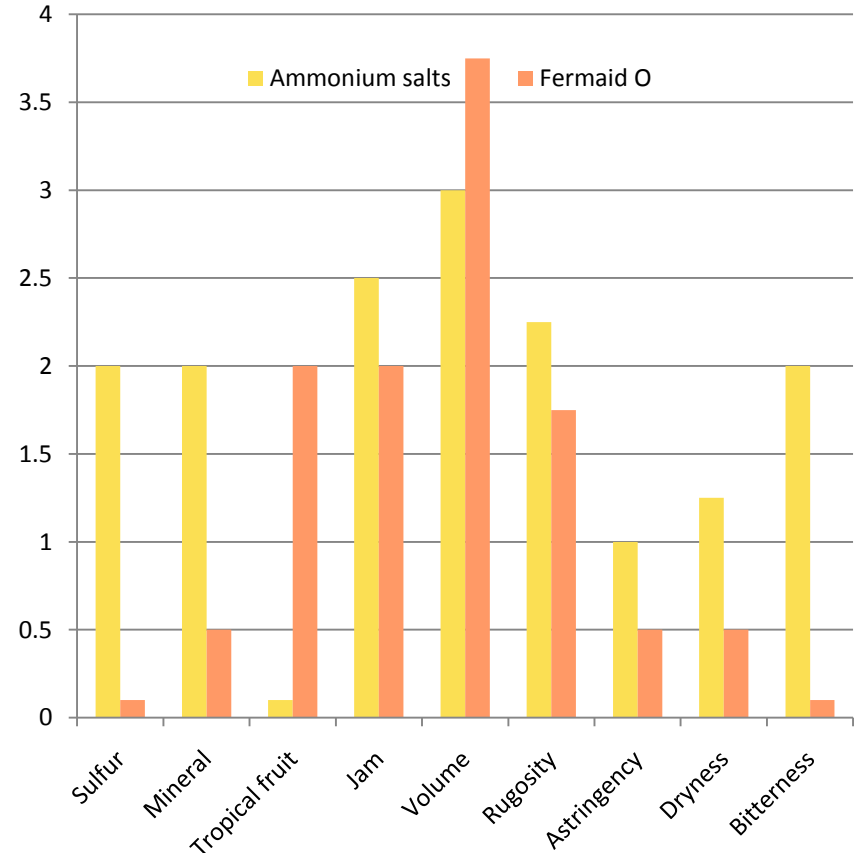


# QUALITY OF NITROGEN ON AROMATIC POTENTIAL

## 2007 Syrah Trial



## 2007 Sauvignon Blanc Trial



# BEST APPROACH FOR FERMENTATION NUTRIENTS

- Integrated approach
- Understanding what cells need, why and when
  - Rehydration nutrients
    - Protect the cells
  - Fermentation nutrients
    - Nourish the cells

THANK YOU

Questions

[nicholah@scottlab.com](mailto:nicholah@scottlab.com)

[rickm@scottlab.com](mailto:rickm@scottlab.com)

