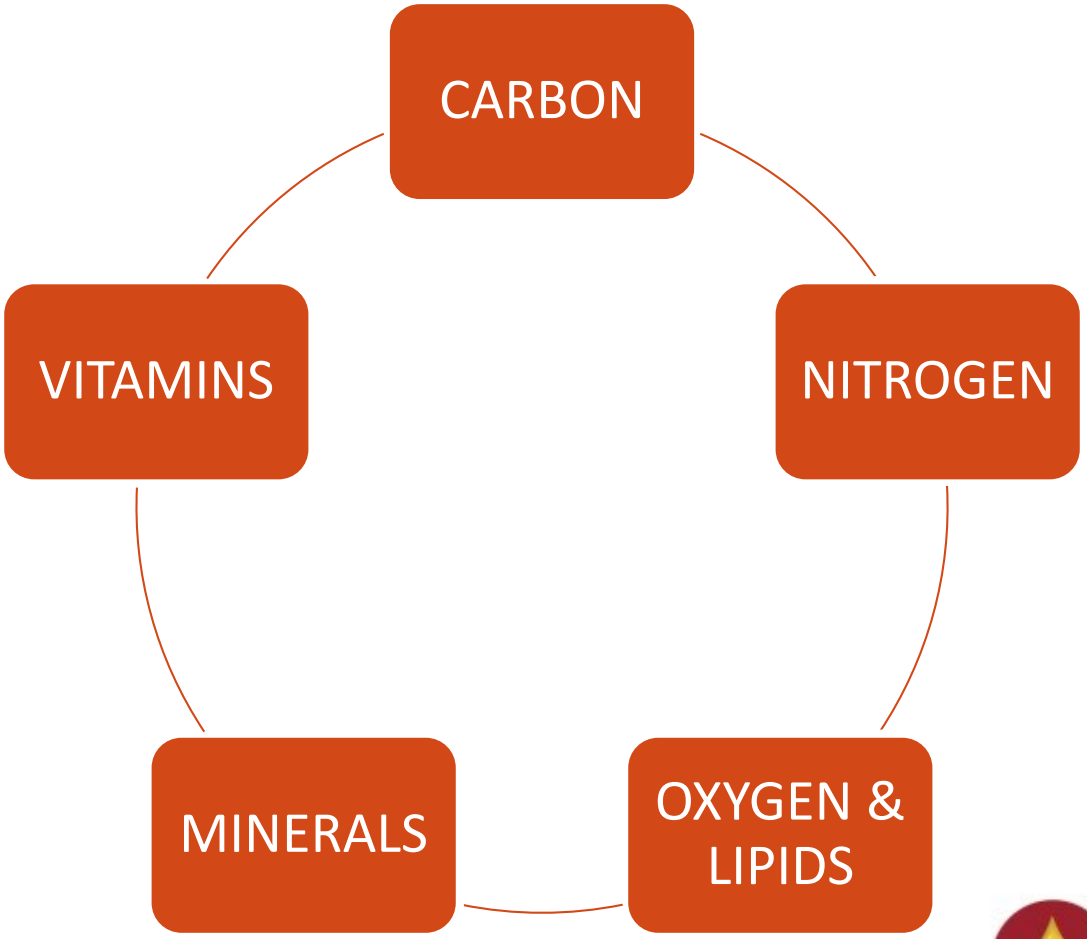
Supplementing Nutrients for Fermentation Success

Megan Hereford

2020 North Carolina Wine Growers Pre-Harvest Meeting

SCOTT LABORATORIES

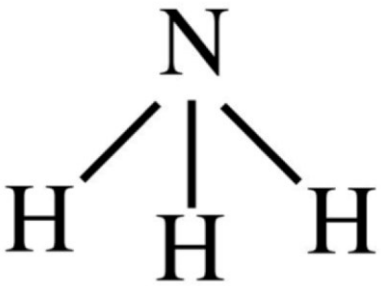
ENOLOGICAL YEAST NUTRIENT REQUIREMENTS



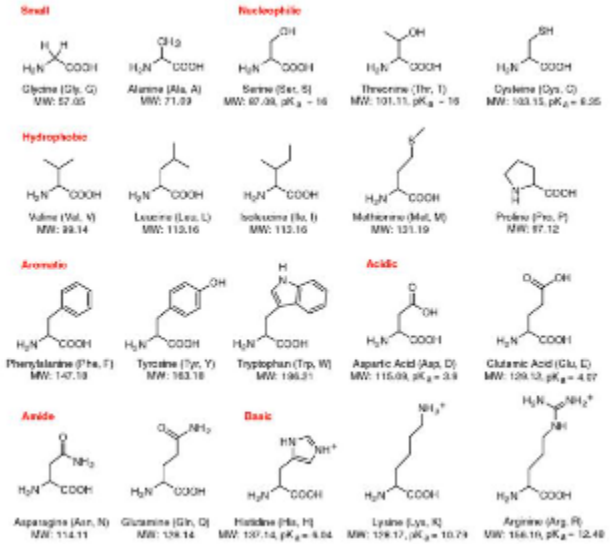
SCOTT LABORATORIES

YEAST ASSIMILABLE NITROGEN

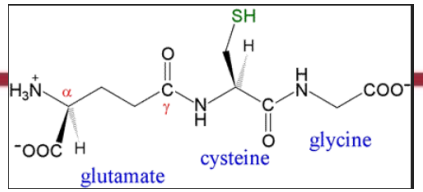
- AMMONIA (Inorganic N)



- AMINO ACIDS (Organic N)



YAN= AMMONIA NITROGEN + PRIMARY AMINO NITROGEN + PEPTIDES



SCOTT LABORATORIES

ENOLOGICAL YEAST NUTRIENT REQUIREMENTS

- 1º Nutrients- Yeast Rehydration
  - Sterols/lipids
  - Yeast vitality and membrane health
- 2º Nutrients- Fermentation
  - Stimulation of yeast metabolism
  - Stimulation of enzymatic activities
    - **maximize aromatic potential**

SCOTT LABORATORIES

ENOLOGICAL YEAST NUTRIENT REQUIREMENTS

- Yeast also needs
  - Vitamins
  - Minerals
  - Survival Factors
- Higher YAN requirements=higher needs of all factors
- Higher Initial Sugar Content= higher YAN needs
- Poor Fruit Quality= higher YAN needs

SCOTT LABORATORIES

CALCULATING YAN NEEDS

- How much YAN does your specific yeast need?
  - Low, Medium, High
- Low
  - Sugar (g/L) x 0.75 = ppm Nitrogen required
- Medium
  - Sugar (g/L) x 0.9 = ppm Nitrogen required
- High
  - Sugar (g/L) x 1.25 = ppm Nitrogen required

SCOTT LABORATORIES

CALCULATING YAN NEEDS

Example:

Fermenting Sauvignon Blanc at 22.5 brix using QA23 (low N requirements).

= sugar content of 246.20 g/L

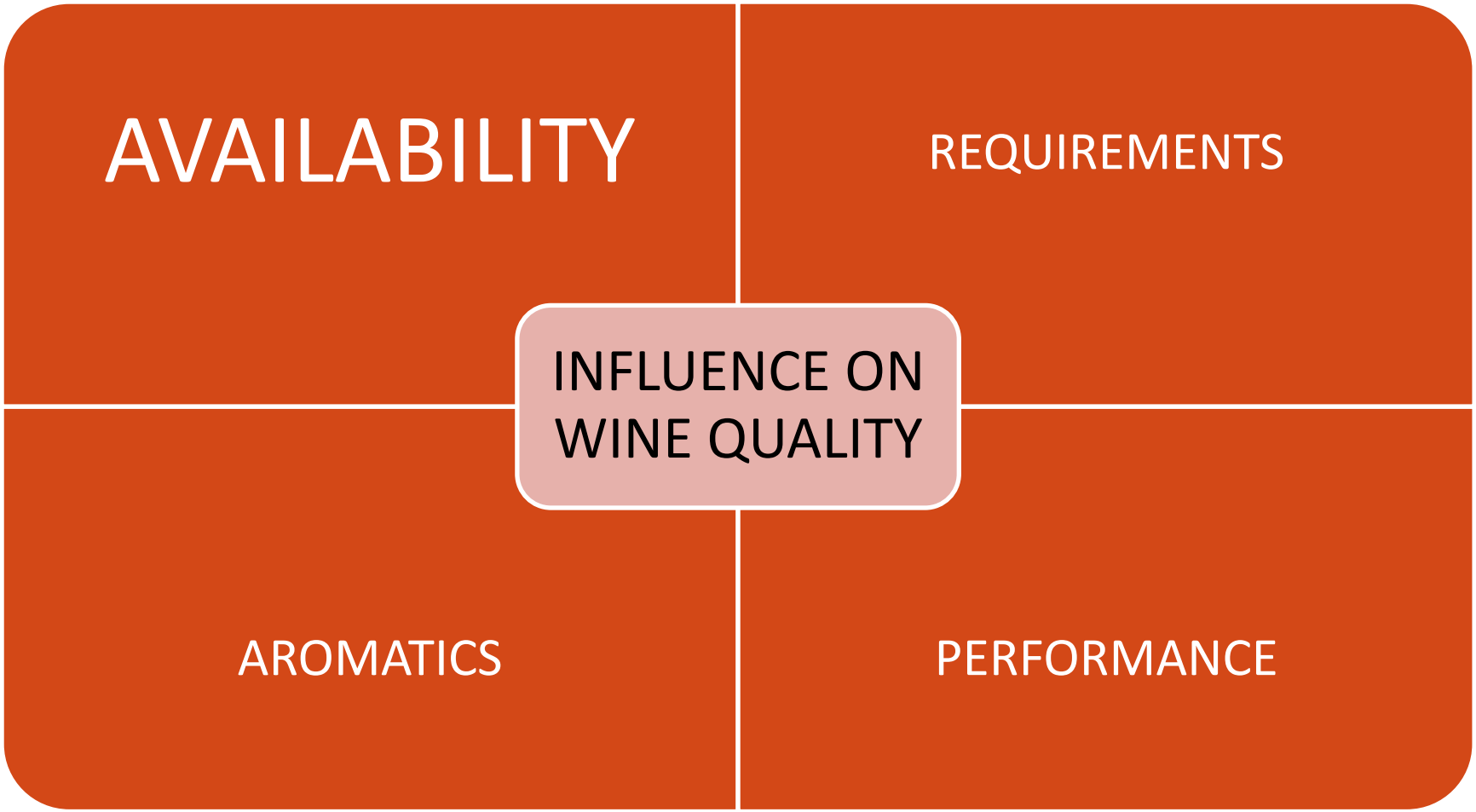
246.2 g/L x 0.75 = 184.5 ppm YAN required

YAN of juice (50 ppm)

150 ppm absolute YAN minimum to complete fermentation- target 200 ppm

SCOTT LABORATORIES

NITROGEN



SCOTT LABORATORIES

NITROGEN AVAILABILITY

HARVEST

TRANSPORT

EXTRACTION

CLARIFIC-ATION

MICROBES

GRAPE BERRY YAN

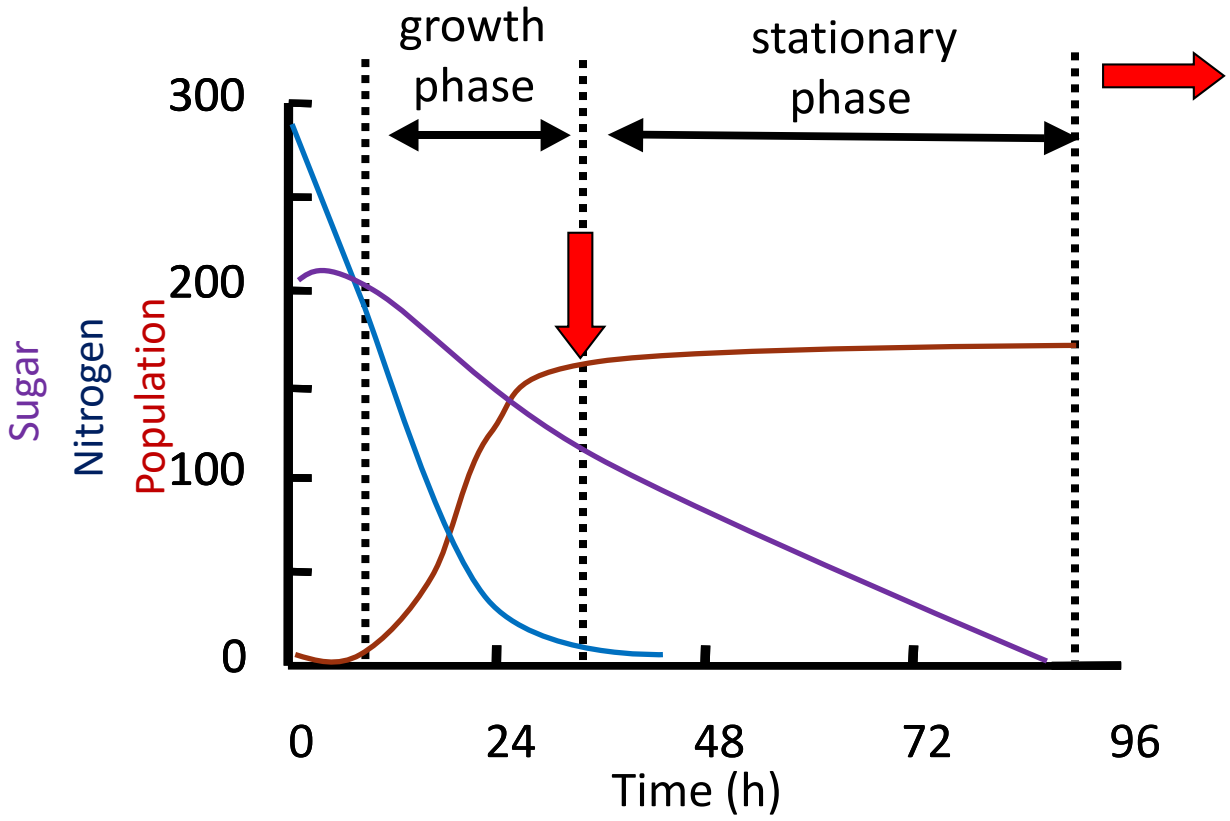
MUST/JUICE YAN

FINAL YAN

NUTRIENT ADDS…

SCOTT LABORATORIES

OPTIMAL TIME OF ADDITION



- High yeast population in YAN deficiency
- Still more than 50% of sugar to be consumed by yeast
- End of the yeast multiplication phase = dilution of sterols and other reserve compounds = yeast in a weakened state

1/3 AF = Optimum time to supplement the fermenting must with appropriate nutrition

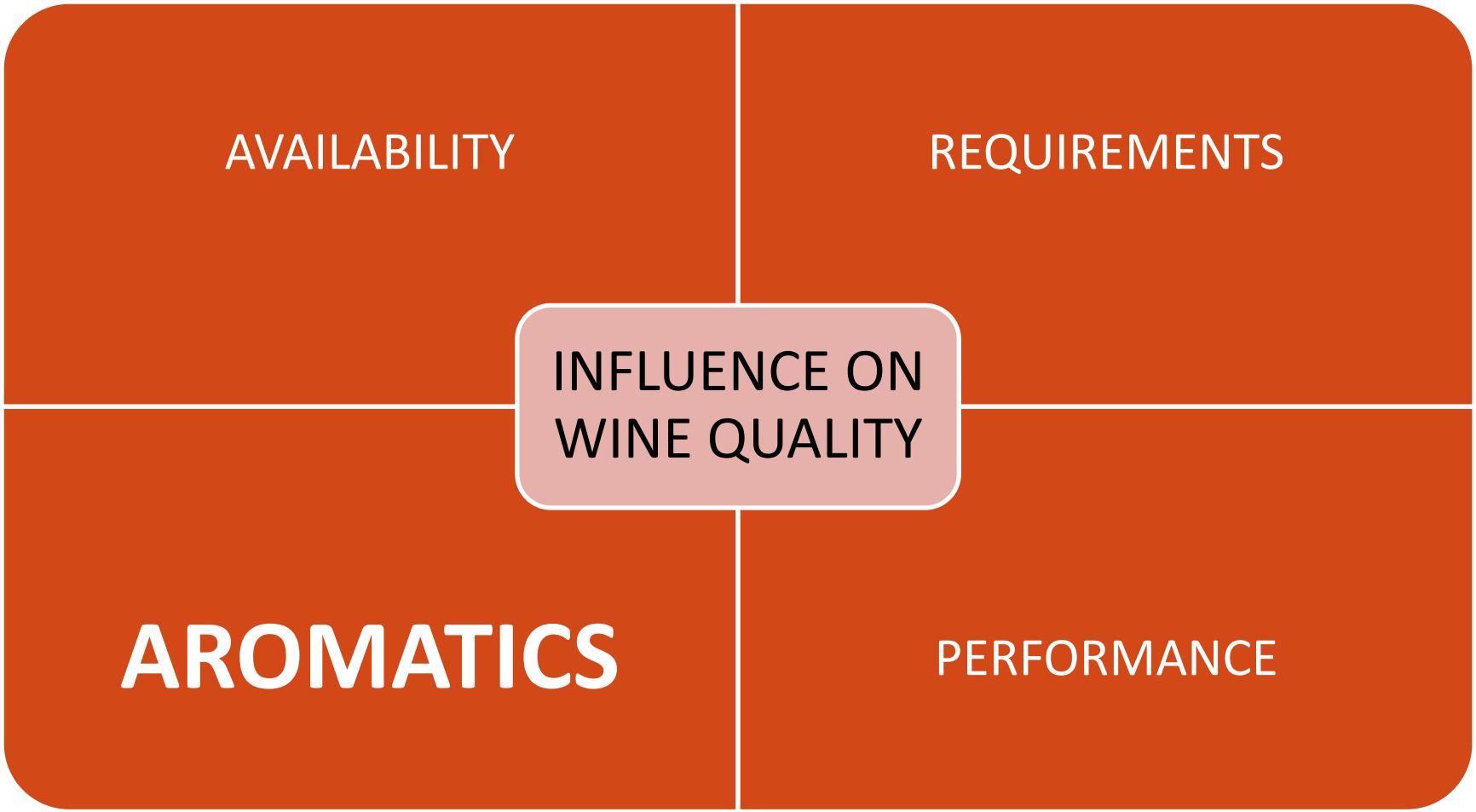
SCOTT LABORATORIES

IS ALL NITROGEN CREATED EQUAL?

- A good source of Nitrogen for yeast is one that is rapidly and economically transported and readily degraded without toxic side effects on the cells…
- But, for enological purposes?
  - NO!

SCOTT LABORATORIES

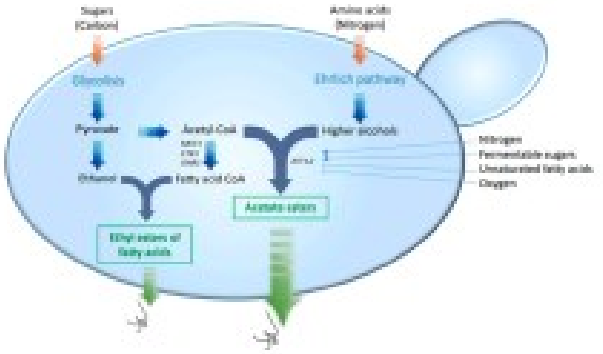
NITROGEN



SCOTT LABORATORIES

ESTER FORMATION

ACID	ALCOHOLS	ESTERS
• ACETIC • SHORT-MEDIUM CHAIN FATTY ACIDS	• ETHANOL • HIGHER ALCOHOLS	• ACETATE • ETHYL



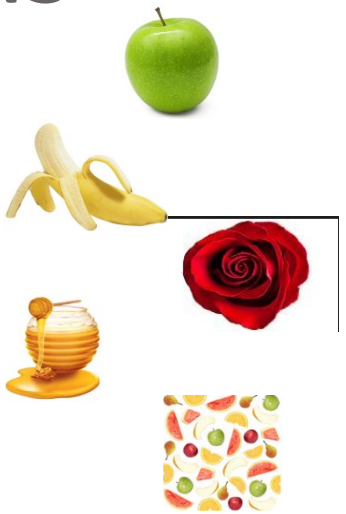
Ester formed

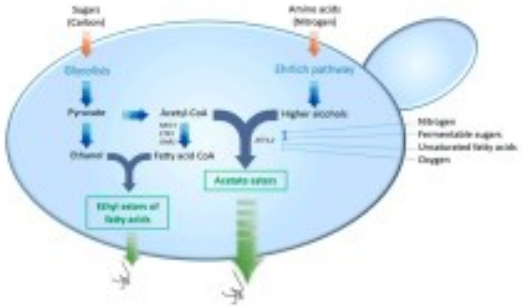
- Enzymatic esterification during fermentation
- Chemical esterification during storage

SCOTT LABORATORIES

S. CEREVISIAE- INFLUENCE ON ESTERS

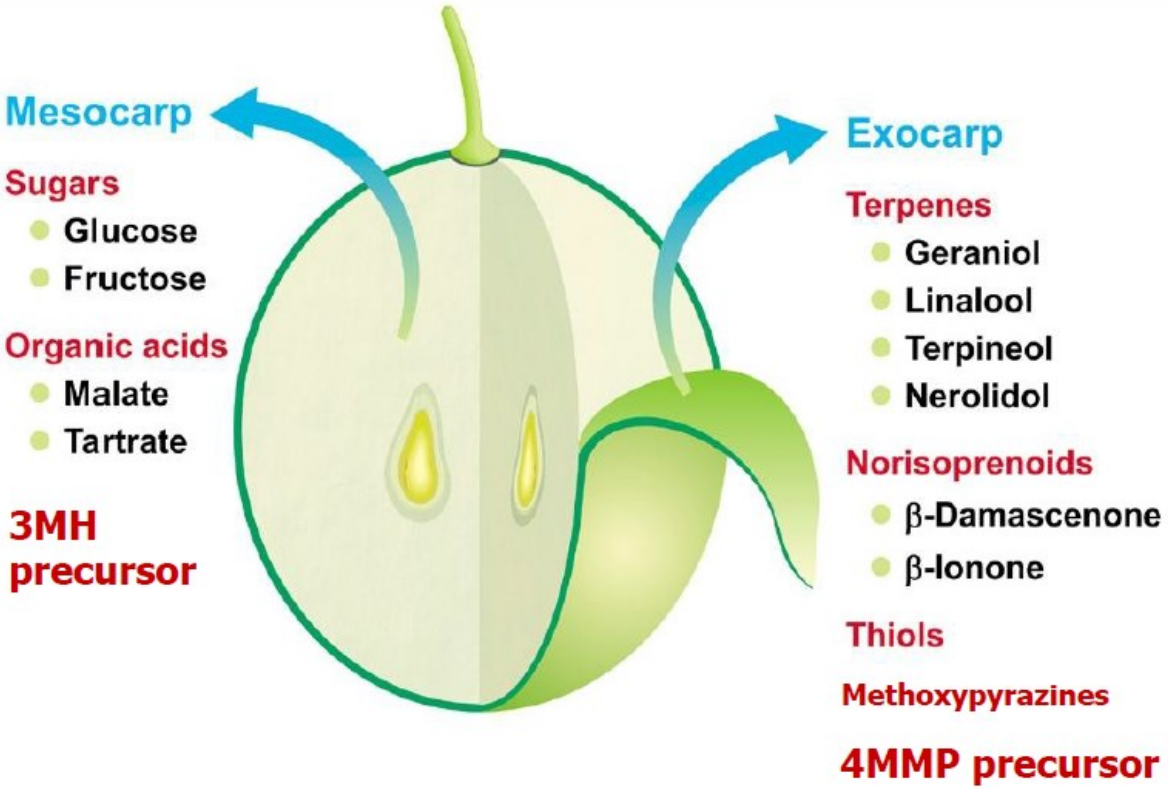
- Ester are volatile molecules
  - Fruity and floral
- Formed via a reaction between an alcohol and an acid
  - Ethyl esters (of fatty acids)
    - Formed via ethanol and acid
      - E.g. Ethyl hexanoate (aniseed, apple), Ethyl octanoate (sour apple)
  - Acetate esters (of higher alcohols)
    - Formed via acetate (derivative of acetic acid) and ethanol
      - E.g. Isoamyl acetate (banana), Isobutyl acetate (fruity), Phenyl ethyl acetate (rose, honey), Ethyl acetate (solvent)
- Ester formation
  - Enzymatic esterification during fermentation
  - Chemical esterification during storage





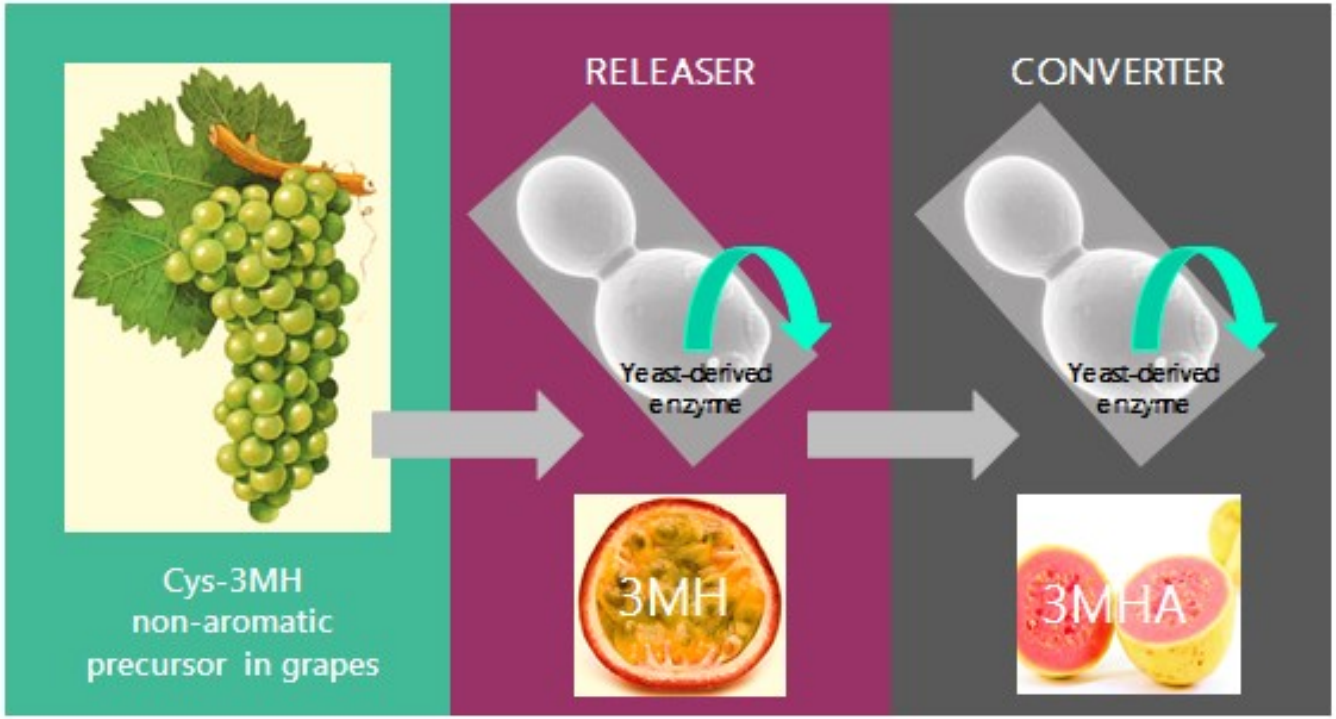
SCOTT LABORATORIES

VARIETAL THIOLS



SCOTT LABORATORIES

YEAST ARE THE CATALYSTS!



SCOTT LABORATORIES

Impact on Style- Chardonnay

	MINERAL PROFILE	FRUITY PROFILE	TROPICAL PROFILE	BARREL FERMENTED PROFILE
SOLIDS GOAL	50-80 NTU's	60-80 NTU's	80-100 NTU's	100-120 NTU's
REHYDRATION NUTRIENT	GOFERM PROTECT EVOLUTION AT 30g/hL (2.5# /1000 gallons)			
YEAST STRAIN at 25g/hL (2#/1000 gallons)	Vitilevure Quartz or DV10	CVW5 or CROSS EVOLUTION (if volume in the mouth is desired)	QA23 or ALCHEMY II *2	CY3079, D47 or Vin2000
FERMENTATION TEMPERATURE GOAL	15-18°C (59-65°F)	18-20°C (65-68°F)	18-20°C (65-68°F) 13-16°C (56-61°F*2)	18-22°C (65-72°F)
JUICE ADDITIONS	Glutastar at 30 g/hL (3 lb/1000 gallons)			
NUTRIENT ADDITION AT 2-3 BRIX DROP *YAN DEPENDENT	10g/hL DAP* 10g/hL FERMAID O	10- 40g/hL FERMAID O	STIMULA SAUVIGNON BLANC 40g/hL (3.3 #/1000 gallons)	FERMAID O 10-40 g/hL (1.67-3.3 #/1000 gallons)
NUTRIENT ADDITION AT 1/3 BRIX DROP	FERMAID O 10-40 g/hL (1.67-3.3 #/1000 gallons)	STIMULA CHARDONNAY 40g/hL (3.3#/1000gallons)	FERMAID O 10-40 g/hL (1.67-3.3 #/1000 gallons)	FERMAID O 10-40 g/hL (1.67-3.3 #/1000 gallons)
ML STRAIN CHOICE *IF DESIRED	OMEGA SEQUENTIAL INOCULATION AND PARTIAL DEGRADATION	BETA CO-INOC SIMULTANEOUS ALF AND MLF	NO MLF	BETA SEQUENTIAL INOCULATION

Supplementing for Success

what to add when the goal is **fermentation security**

Supplementation Goal	During Rehydration Phase	At 2-3 Brix Drop	At 1/3 Sugar Depletion
50 ppm	GO-FERM PROTECT EVOLUTION 30 g/hL	NO ADDITION	FERMAID O 30 g/hL
100 ppm	GO-FERM PROTECT EVOLUTION 30 g/hL	FERMAID O 20 g/hL	FERMAID O 10 g/hL AND FERMAID K 12.5 g/hL
150 ppm	GO-FERM PROTECT EVOLUTION 30 g/hL	FERMAID O 40 g/hL	FERMAID A 30 g/hL OR FERMAID K 40 g/hL

SCOTT LABORATORIES

Supplementing for Success

what to add when the goal is **ester** production

Supplementation Goal	During Rehydration Phase	At 2-3 Brix Drop	At 1/3 Sugar Depletion
50 ppm	GO-FERM PROTECT EVOLUTION 30 g/hL	NO ADDITION	STIMULA CHARDONNAY 40 g/hL
100 ppm	GO-FERM PROTECT EVOLUTION 30 g/hL	FERMAID O 20 g/hL	STIMULA CHARDONNAY 40 g/hL
150 ppm	GO-FERM PROTECT EVOLUTION 30 g/hL	FERMAID O 40 g/hL	STIMULA CHARDONNAY 40 g/hL

SCOTT LABORATORIES

Supplementing for Success

what to add when the goal is **thiol** revelation & expression

Supplementation Goal	During Rehydration Phase	At 2-3 Brix Drop	At 1/3 Sugar Depletion
50 ppm	GO-FERM PROTECT EVOLUTION 30 g/hL	STIMULA SAUVIGNON BLANC 40 g/hL	FERMAID O 10 g/hL
100 ppm	GO-FERM PROTECT EVOLUTION 30 g/hL	STIMULA SAUVIGNON BLANC 40 g/hL	FERMAID O 20 g/hL
150 ppm	GO-FERM PROTECT EVOLUTION 30 g/hL	STIMULA SAUVIGNON BLANC 40 g/hL	FERMAID O 40 g/hL

SCOTT LABORATORIES

Glutastar for Aroma and Oxidation Protection

- Protects color and aromas from oxidation during the earliest stages of post-harvest winemaking
- Long lasting effect leads to prolonged wine shelf life
- Glutathione in its reduced form GSH, scavenges ortho-quinones
- Protects aromatic thiols from oxidated ortho-quinones.

SCOTT LABORATORIES

SO, NITROGEN…

- Avoid spiking cell population by having excess
- Focusing on amino acids/ organic nitrogen as the cells are ~5 times more efficient
- Changes to N target winemakers strive for
  - More holistic approach
  - Less adds and more aromatic wines!

We are starting to understand the interactions between nitrogen and other key micronutrients

SCOTT LABORATORIES

OXYGEN IS A YEAST NUTRIENT!

- Oxygen is taken up by yeast cells very quickly
  - During the fermentation process it needs to be supplied (~8ppm)
  - Used for yeast cell membrane integrity compounds
    - If deficient
      - Decrease in yeast growth
      - Decrease in yeast viability (at end of fermentation)
      - Decrease in membrane protein activity
      - Increase toxic compounds
        - » Short and medium chain fatty acids
    - By supplying Oxygen increasing the cells ability to withstand the toxic effects of ethanol

SCOTT LABORATORIES

Don’t Forget! Carolina Wine Supply is now stocking Scott Labs Fermentation Products!

Questions

MEGANH@SCOTTLAB.COM

1-540-239-9211

SCOTT LABORATORIES