

Impact of potassium source on growth, yield, and cured leaf chemistry of burley and dark tobacco

Bob Pearce and Andy Bailey
University of Kentucky

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Common Sources of Potassium Fertilizer

- **Sulfate of potash: 0-0-50**
 - Intermediate cost
 - Preferred source for burley and dark tobacco
- Muriate of potash: 0-0-60
 - Lower cost
 - Quality issues for tobacco
- Sul-po-mag: 0-0-22 (K-Mag, Trio)
 - High cost
- Soda-potash: 15-0-14
- Potassium nitrate: 13-0-44
 - High cost
 - Limited availability

Excess Chloride in Cured Tobacco Leaves

- Poor cured leaf color
- Imparts unpleasant flavor and aroma to smoke
- Reduces burn rate
- Cause cured leaf to hold moisture
- Nitrosamines – recent evidence suggest using muriate of potash may reduce TSNAs

Influence of Cl on tobacco combustibility

% Cl in cured leaf	Burning characteristics
< 1%	Excellent
1 to 2 %	Good to Satisfactory
2 to 3%	Unsatisfactory
> 3%	Poor

Tobacco Industry
Standard for
Chloride:

Anything greater
than 1% in cured
leaf is considered
undesirable and in
most cases
unacceptable.

- In all trials, tobacco treated with KCl had numerically lower Tobacco Specific Nitrosamines (TSNA) levels than tobacco treated with K₂SO₄. Reductions in TSNA levels were 30% lower in tobacco treated with KCl compared to tobacco treated with K₂SO₄.
- These results showing lower TSNA from potassium chloride applications, along with minimal effects on moisture and quality grade index, may cause the tobacco industry to rethink its position on recommending potassium sulfate as the preferred potassium source for tobacco production.
- Andrea Keeney Thesis
- https://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1133&context=pss_etds

Trial Objectives

- Andrea's trials were on soils testing in the medium range.
- Would CI have more detrimental effects on leaf quality at higher rates required on low testing soils.
- What is the impact of mixing muriate and sulfate?
 - Current fertility guidelines allow 100 pounds of muriate per acre
 - Supplies 60 pounds K₂O per acre
 - Complete the balance with 0-0-50

Potash Source Trials

2020

- Dark in Princeton (most data lost in tornado)
- Burley in Lexington
- Initial Soil Test K: 152
- Recommended: 340 K₂O/A
- Treatments
 - Check
 - All 0-0-50
 - All 0-0-60
 - Blend

2021

- Dark in Princeton (plots lost to drowning)
- Burley in Lexington (no leaf chemistry or quality data yet)
- Initial Soil Test K: 200
- Recommended: 300 K₂O/A
- Treatments
 - Check
 - All 0-0-50
 - All 0-0-60
 - Blend

2020 Trial

Check



All 0-0-50



2020 Trial

All 0-0-60

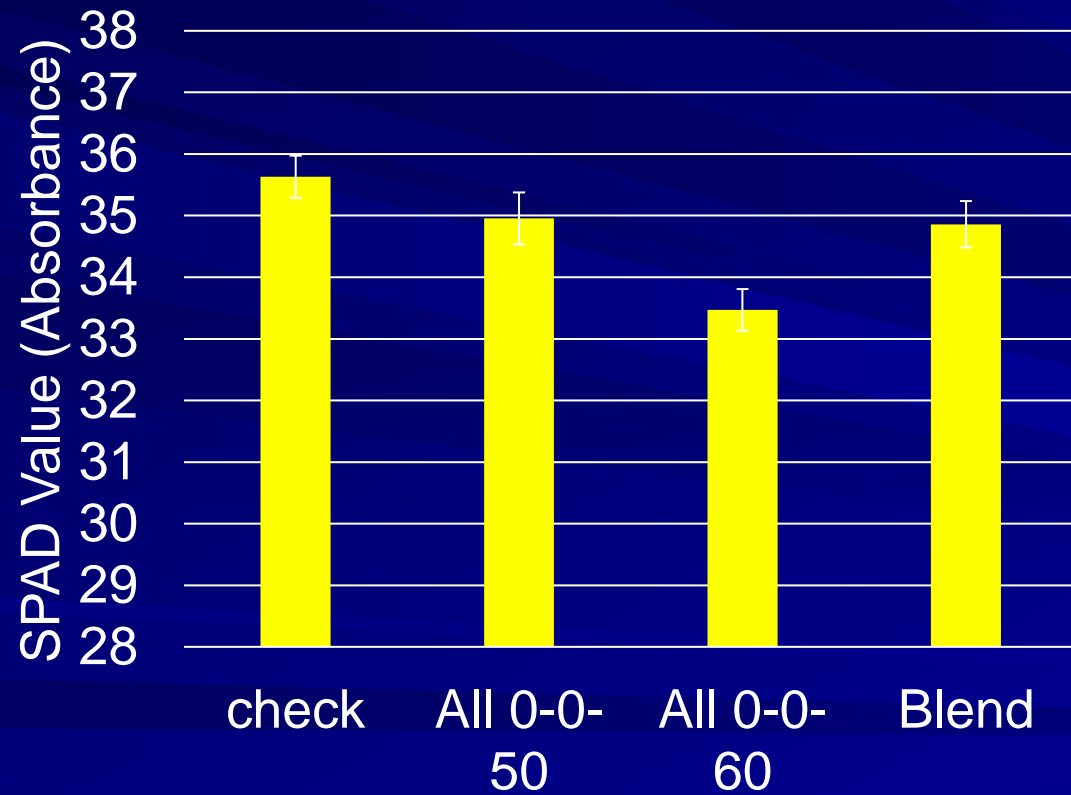


Blend

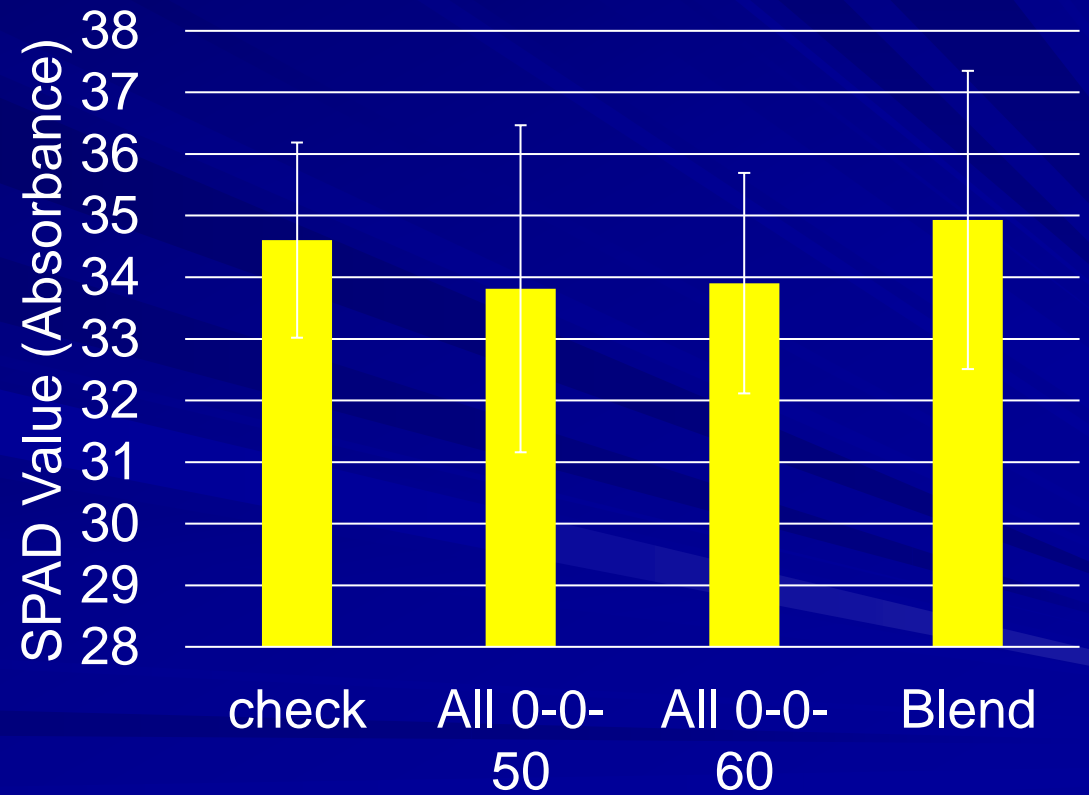


Chlorophyll in growing plants

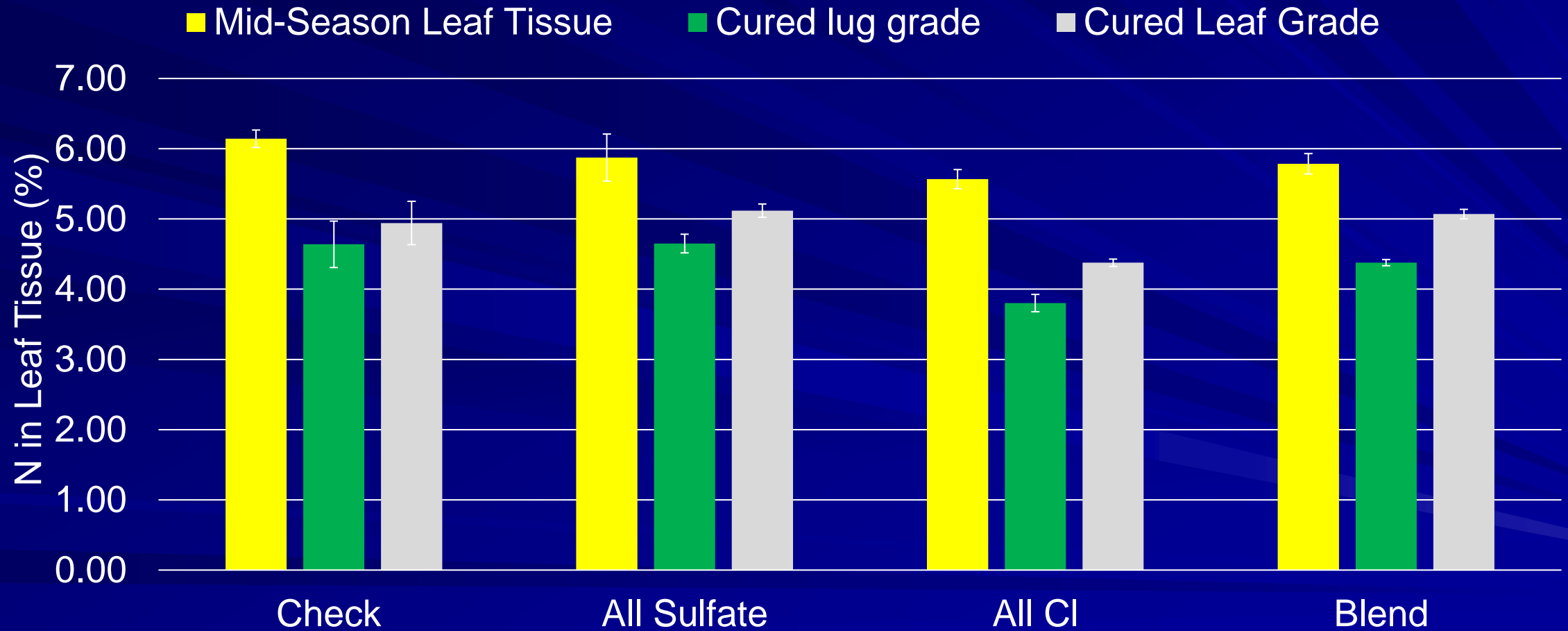
2020



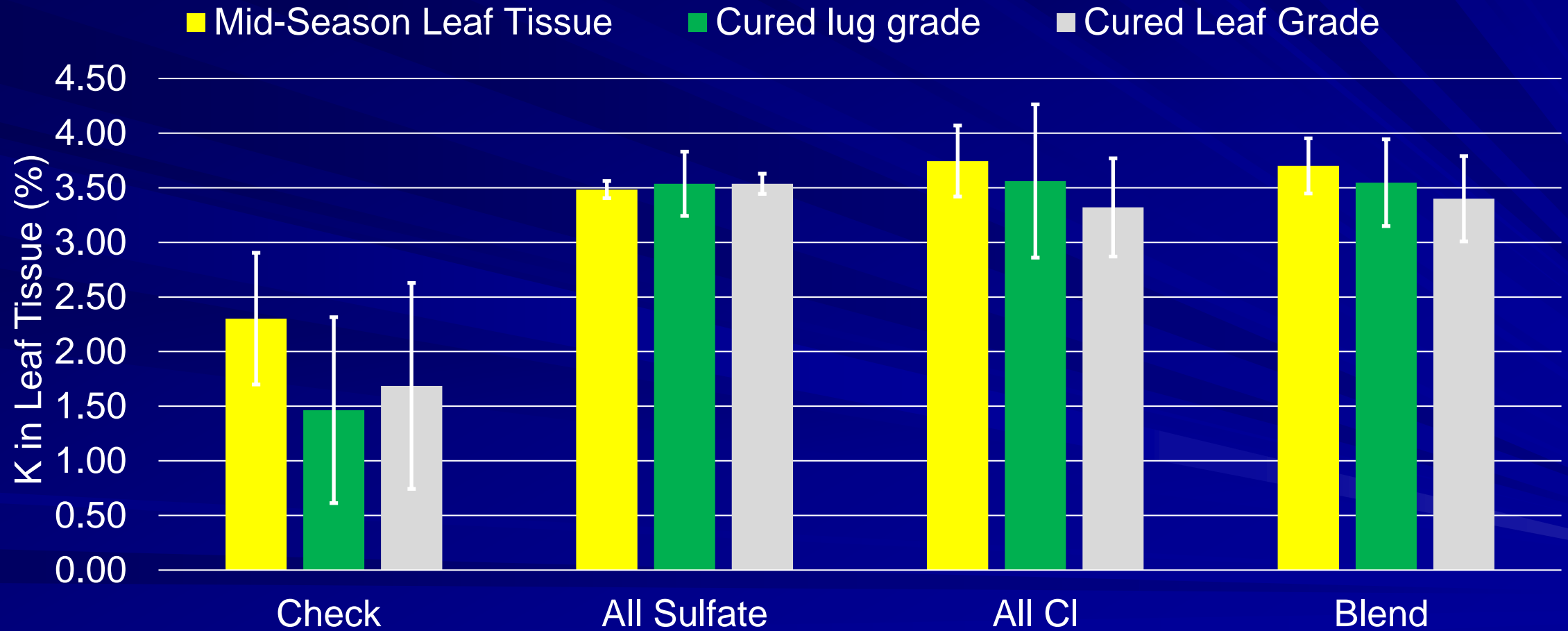
2021



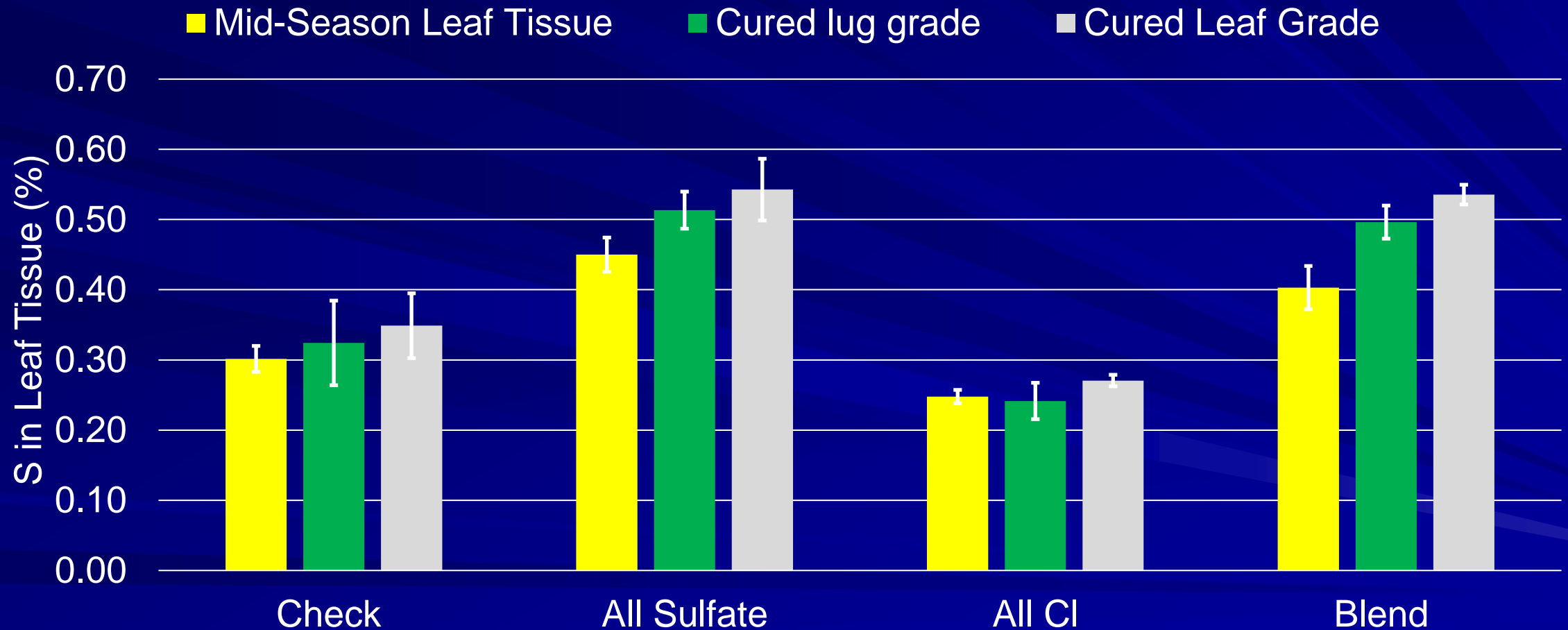
Leaf Nitrogen Concentration 2020



Leaf Potassium Concentration 2020



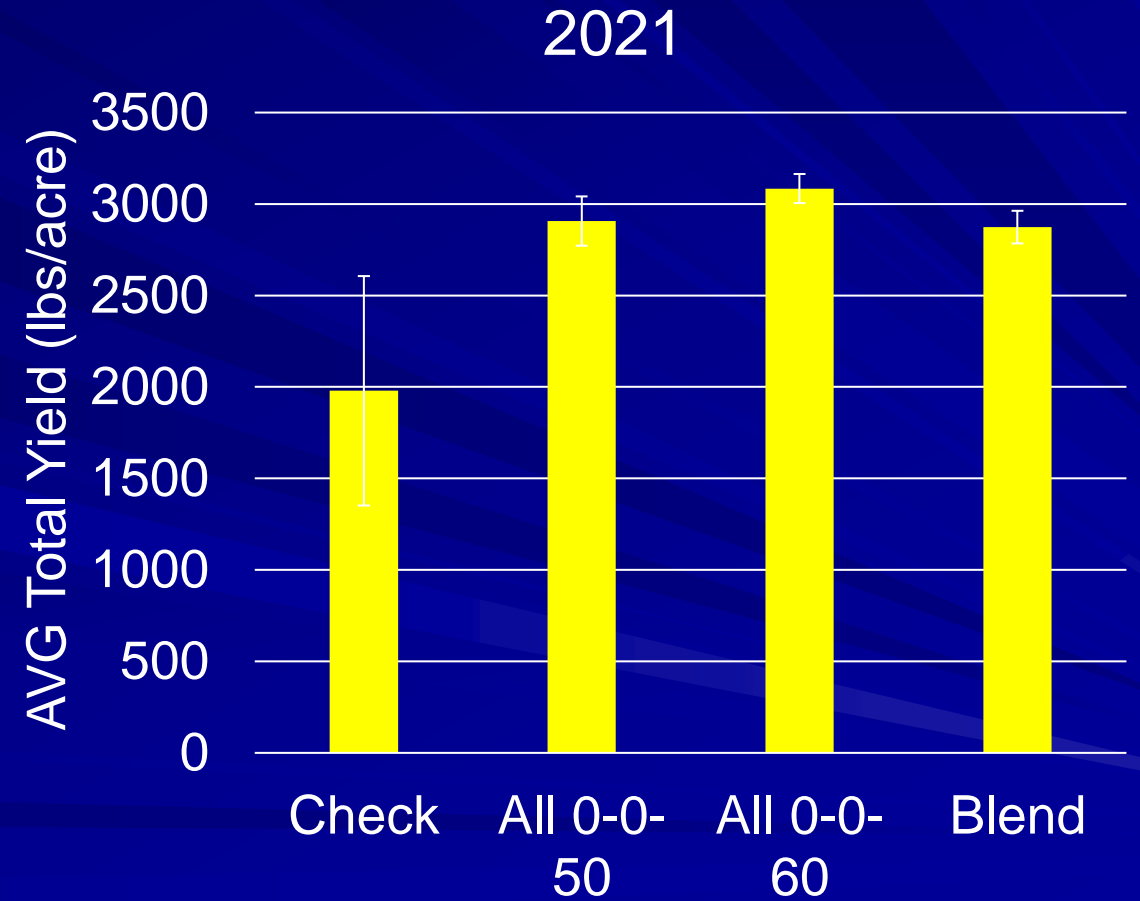
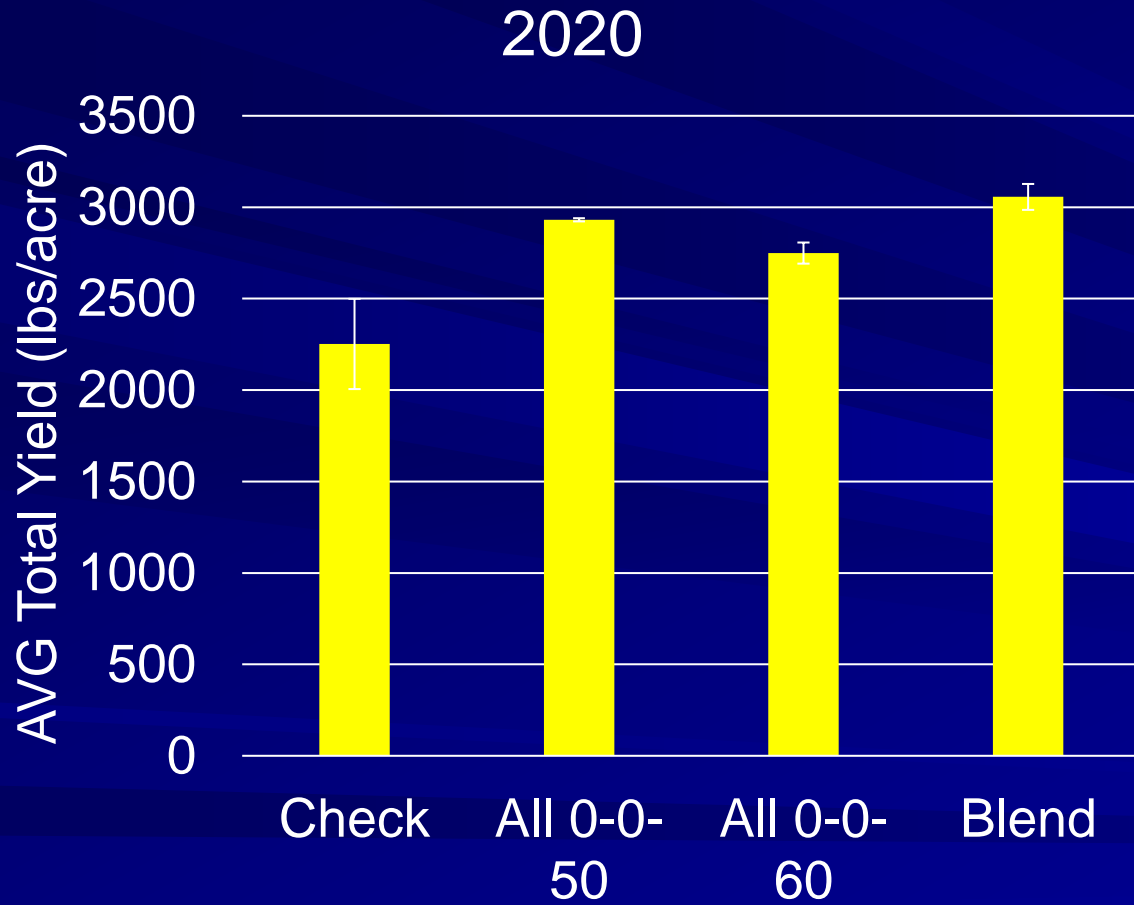
Leaf Sulfur Concentration 2020



Sulfur sufficiency range for burley 0.15 to 0.6

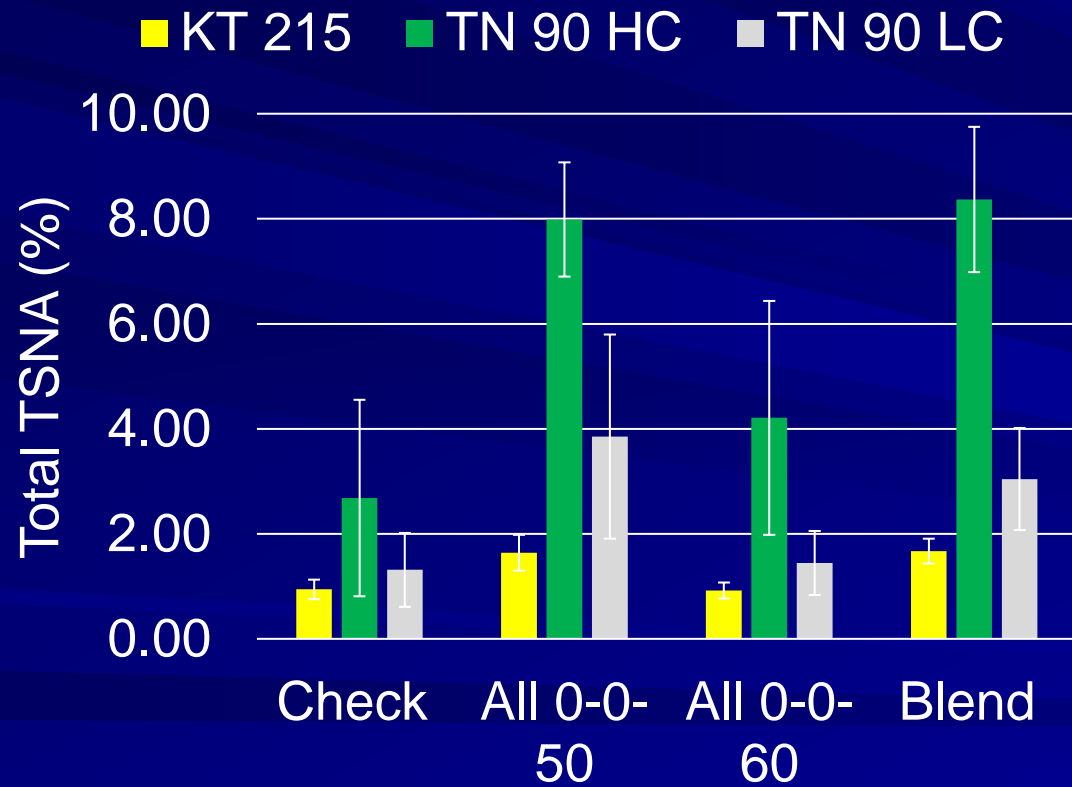
<https://content.ces.ncsu.edu/tobacco-sulfur-deficiency>

Yield

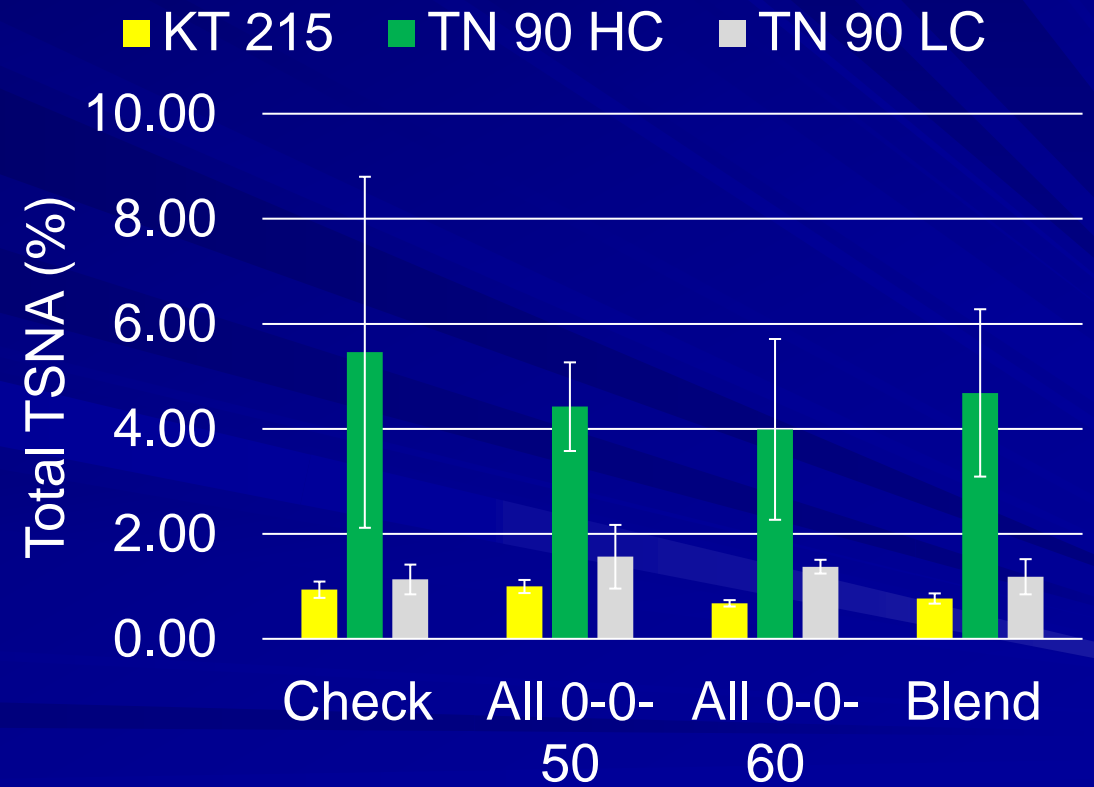


TSNA

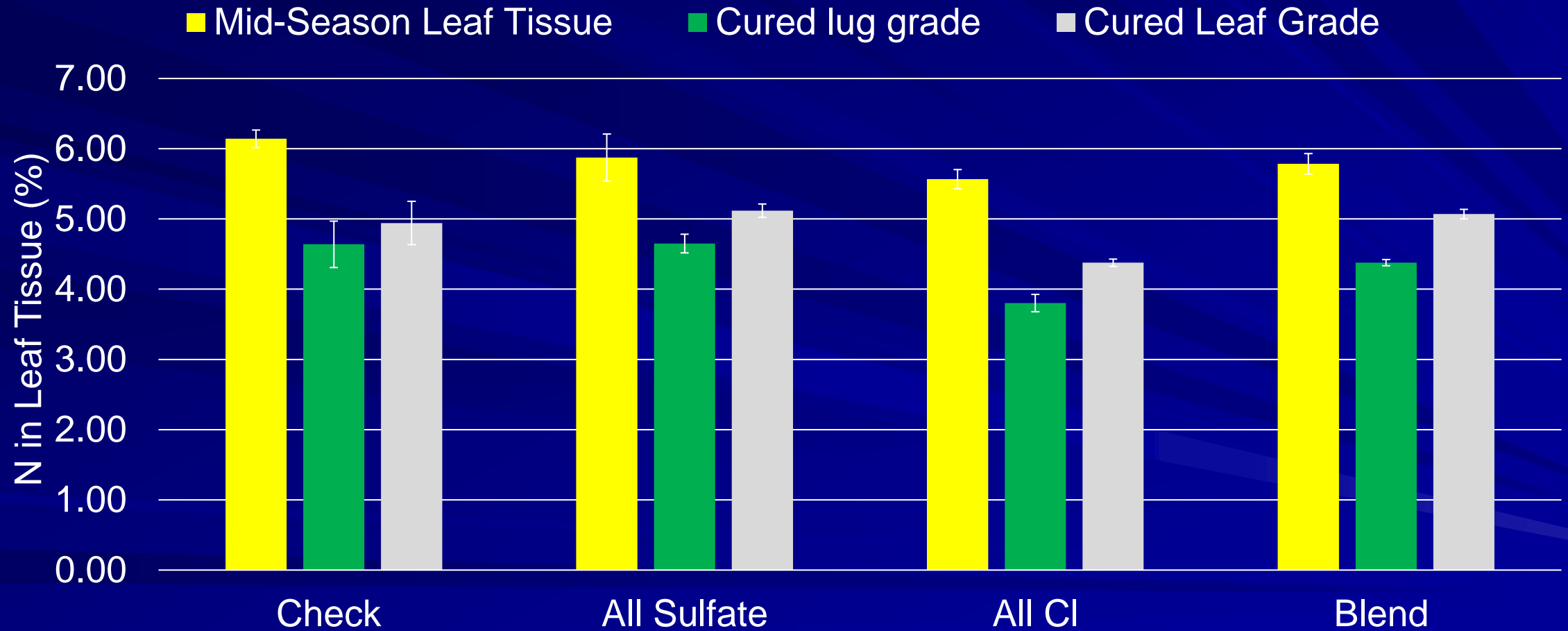
2020



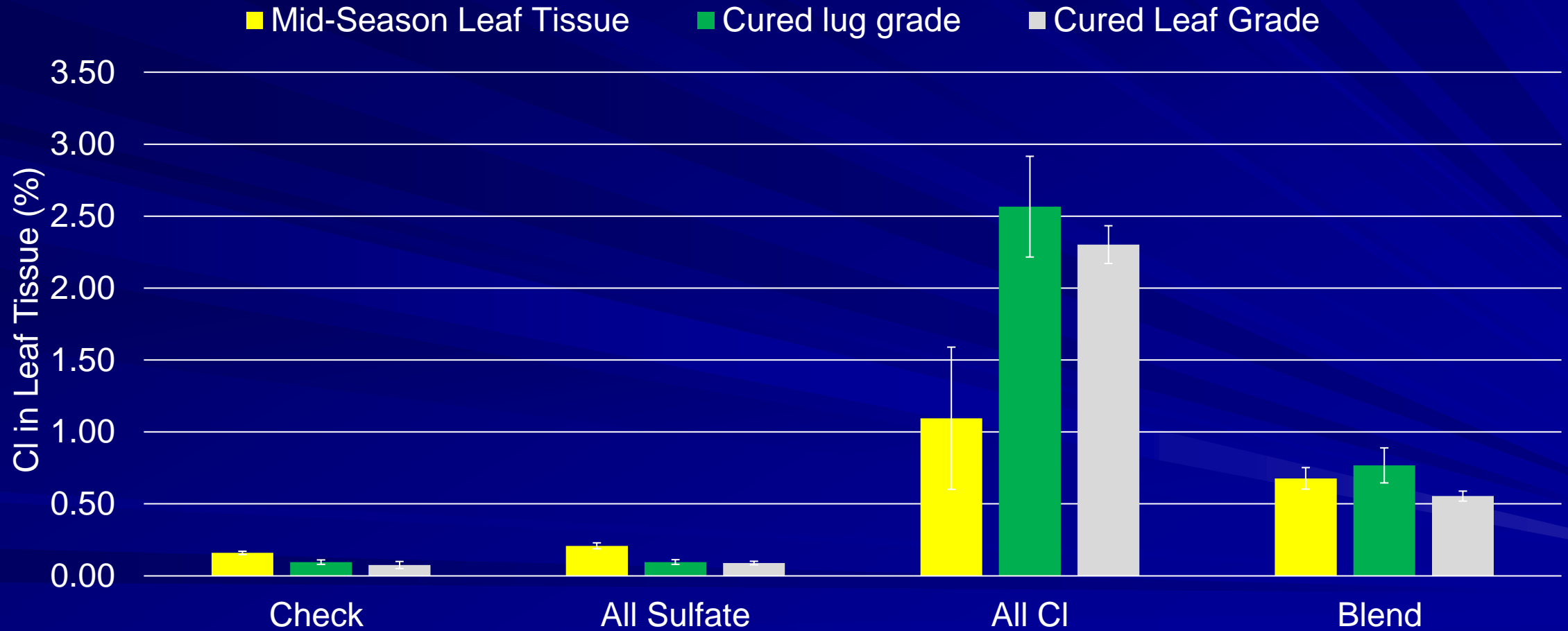
2021



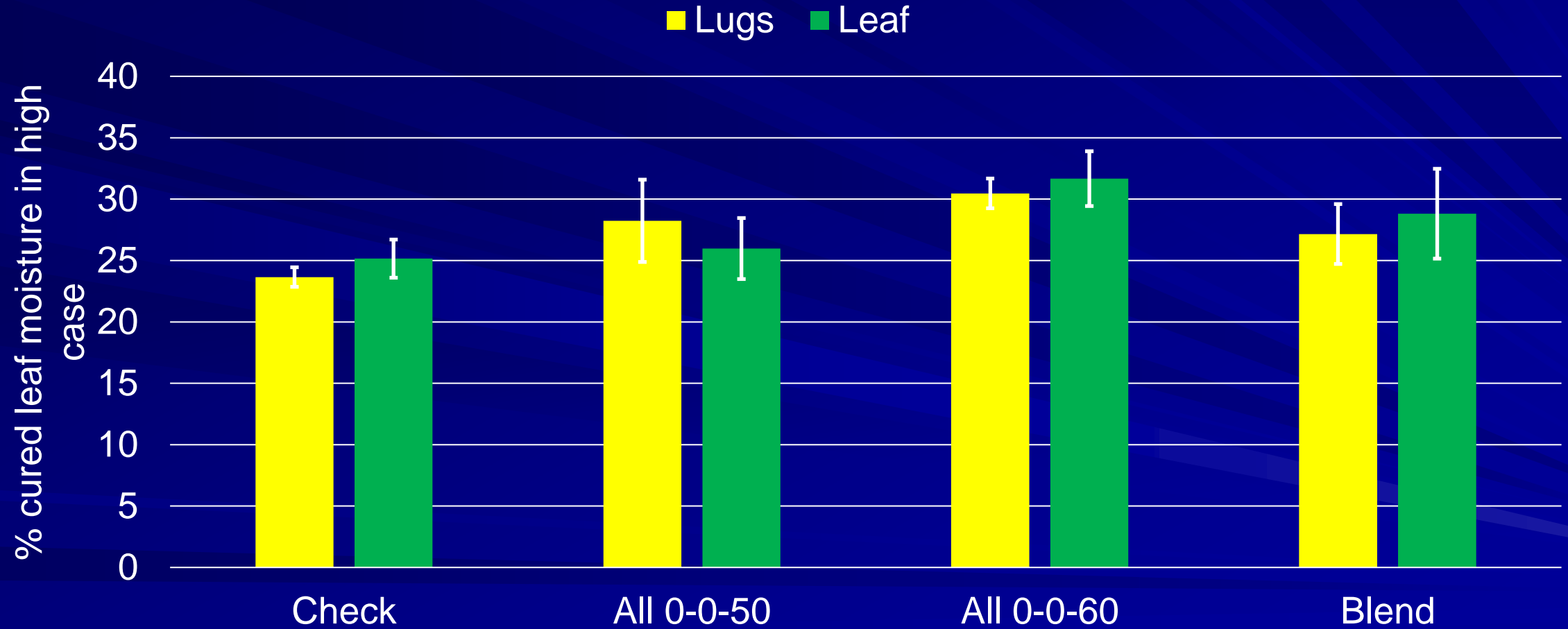
Leaf Nitrogen Concentration 2020



Leaf CI in Leaf Tissue 2020

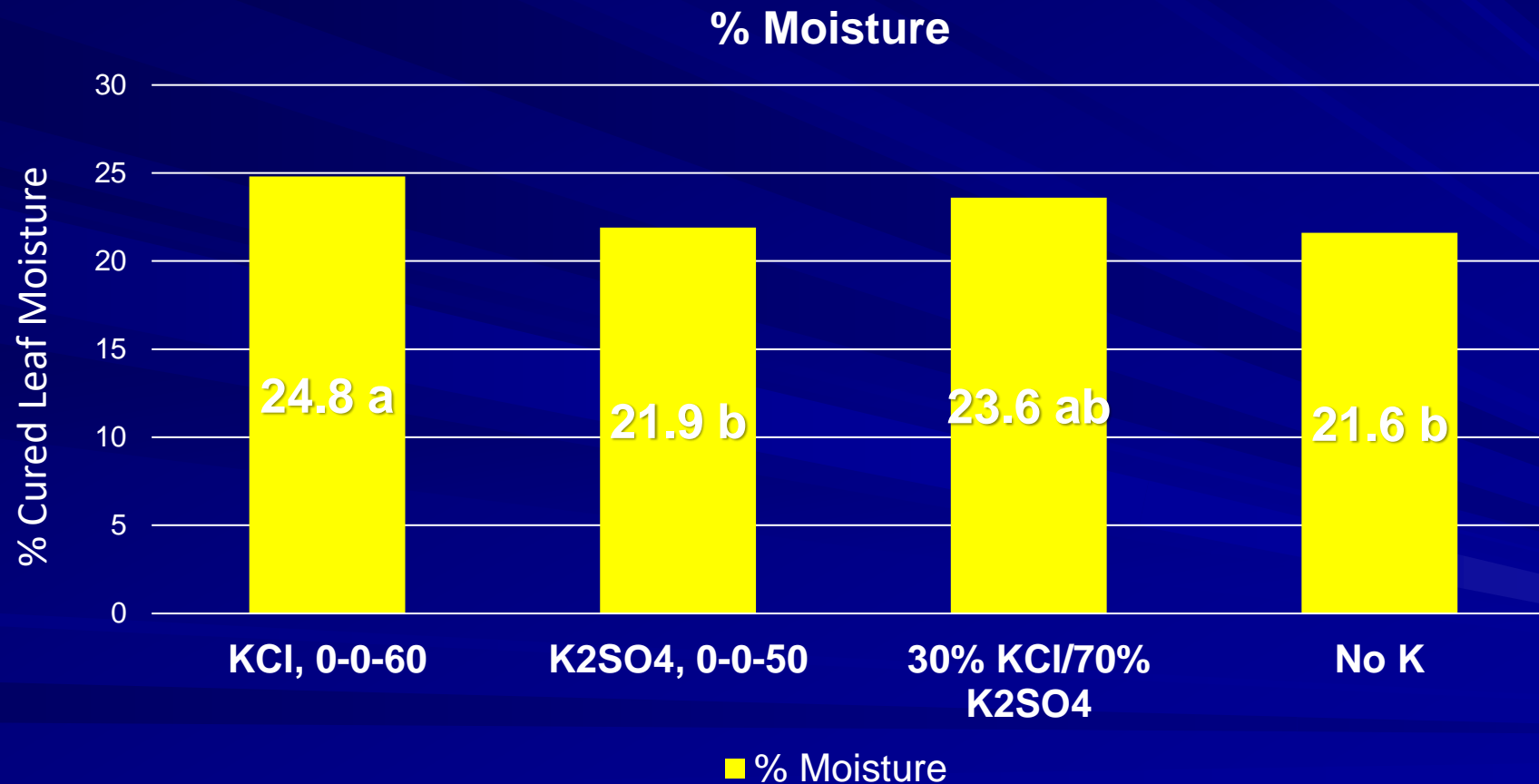


Cured leaf moisture



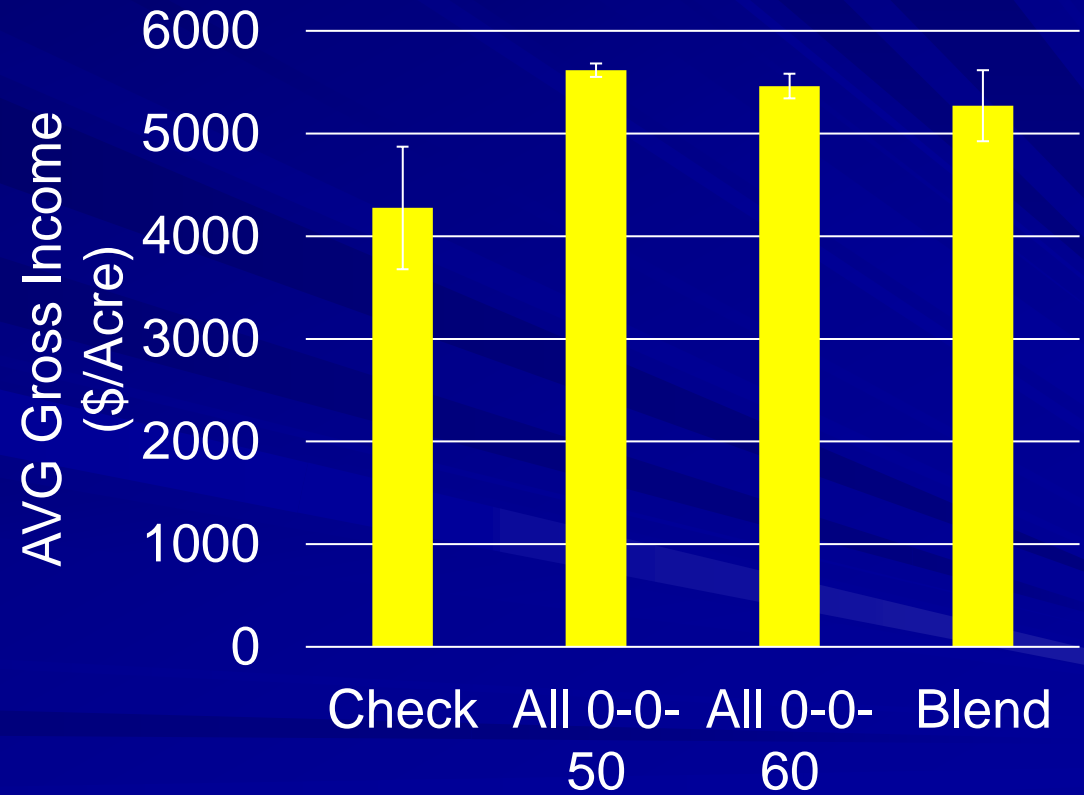
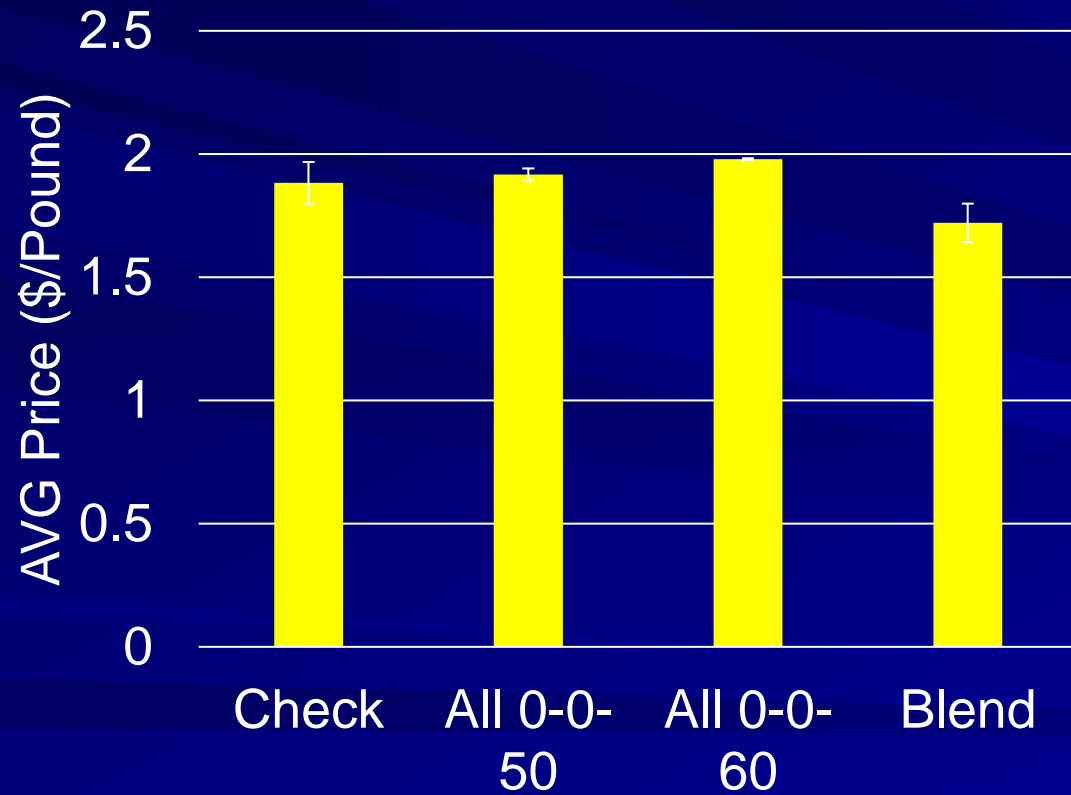
Effect of Potassium Source on Dark-Fired Cured Leaf Moisture

2020 - UKREC, Princeton KY



*KT D17LC, 200 lbs potassium per acre preplant. General moisture limit is 25% for dark fired.

Burley Value 2020



Summary

- Muriate of potash increased chloride levels in leaf and moisture content of cured leaf.
- Muriate decreased total N in leaf and TSNA levels.
- Muriate did not have a negative impact on leaf yield, visual quality or value (smoke tests pending).