



# **TSNA in Air-Cured and Fired-Cured Tobacco Sub-Group**

**Colin Fisher**

Coordinator and SC Liaison

**Cancun, Mexico**

**15 October 2023**

- **Broad outline of Objectives**

Investigate practices that reduce TSNA  
in air-cured and fire-cured tobacco  
at any stage of tobacco production  
through collaborative studies and information gathering

- Specific objectives modified through years

TSNA remains an important aspect of tobacco harm reduction for all stakeholders

but:

- limited industry resources and ever-changing regulatory environment necessitated shifting effort to other priorities
  - low alkaloid
  - HTP
    - cost of TSNA analysis also limiting factor
- dwindling SG participation
  - proposal to terminate sub-group
  - pending interest and participation in new collaborative study



# Potassium Chloride Fertilization Collaborative Study

## ➤ Rationale

- Recent studies with air-cured tobaccos in Kentucky demonstrated that potassium chloride applied as source of potassium before transplanting reduces TSNA in cured leaf
- Adverse effects of high chloride levels & moisture retention in the cured leaf can be mitigated if the amount applied is limited
- Is this a feasible strategy to be used in diverse growing regions?

## ➤ Objectives

1. Establish whether fertilization with potassium chloride (KCl) reduces TSNA in cured leaf of air-cured tobaccos
2. Establish whether the increase in chloride content of cured leaf resulting from KCl applications is detrimental to cured leaf quality in any of several different ways



# KCI Collaborative Study

- **Preparation Timeline:**

- **2022**

- **Feb 21** – exploratory email to all previous SG attendees to gauge interest in collaborative study
  - 7 positive responses
- **March 9** – production practice questionnaire sent to prospective collaborators
- **April 5** – NWIP to SC members for approval
- **April 19** – NWIP approved as CORESTA Project #333
- **May 9** – draft protocol distributed to all interested stakeholders
- **May 18** – SG virtual meeting
  - discussion of protocol
  - 19 participants



# KCI Collaborative Study (cont'd)

- **Antibes, April 2023**
  - **Study does not include provision for smoke flavor analysis**
    - **Smoking tests would add value**
      - smoke panel availability
      - logistics (volume, shipping & import regulations)
    - **Consensus that regardless of above, study still has value to industry**
- **NB:**
- Objectives of this study is comparison between the two K<sub>2</sub>O treatments at each location
  - Comparisons between locations not relevant for this test



# KCI Collaborative Study (cont'd)

- **Protocol finalized May 2022**

- Simple as possible to accommodate field work sites with little or no research infrastructure
- Potassium sources: chloride & sulphate
- Application rate: as locally recommended
- Four replications
- All data collected & processed locally
  - TSNA
  - Alkaloids
  - Moisture content
  - Chlorine
  - Quality



# KCI Collaborative Study (cont'd)

- Protocol finalized May 2022

- Simple as possible to accommodate field work sites with little or no research infrastructure
- Potassium sources: chloride & sulphate
- Application rate: as locally recommended
- Four replications
- All data collected & processed locally
  - TSNA
  - Alkaloids
  - Moisture content
  - Chlorine
  - Quality

Experiment design simplified to enable participation by coordinators who do not have extensive resources

## ANOVA DF

Rep	3
Trmt	1
<u>Error</u>	<u>3</u>
Total	7





# 2 & 5 Year Plans

## Round 1

Northern hemisphere	Mar 22 – Mar 23
Southern hemisphere	Jun 22 – June 23
Report of preliminary results	Oct 23
Full report of 1st round of tests	Oct 24

## Round 2

Northern hemisphere	Mar 23 – Mar 24
Southern hemisphere	Jun 23 – June 24
Report of preliminary results	Oct 24
Full report of 1st round of tests	Oct 25

- **Issues encountered**

- Complexity of test, despite simplified design
- K sources not available
- Unable to follow moisture protocol
- Post-cure moisture evaluation “not valid”
- Lack of scale for weighing moisture samples
- Access to analytical lab
- Combining reps before quality evaluation, chemistry analysis



# KCI Collaborative Study: Protocol Overview

- **Traceability:** labeling at all stages to maintain plot/sample integrity
- **Plot size:** # rows/plot; # plants/row
- **Plot layout:** randomized
- **Fertilization:** identical N & P, K differ by formulation only; including border rows
- **Harvesting:** center row, guard plants not included in sample
- **Collecting and preliminary processing of samples for chemistry analysis:**  
4<sup>th</sup> leaf from top of plant; midrib removed; air (not oven) dried
- **Moisture content and quality evaluation:** same samples used for both  
QE using any numerical method (GI, \$, 1-5 scale)  
MC: equilibrate in high humidity, weigh, dry, re-weigh
- **Chemistry:** In-house/local methods used to analyze the alkaloids, TSNAs and chloride content using same method for all samples



# Current and prospective collaborators

## ➤ Northern Hemisphere

- Yunnan Tobacco Company, China
- University of Kentucky, USA
- University of Tennessee, USA
  - North Carolina State University, USA
  - Reynolds Tobacco Company, USA

## ➤ Southern Hemisphere

- Premium Tobacco, Malawi
- Premium Tobacco, Uganda
- Zimbabwe Tobacco Research Board
- Universal Leaf Tobacco, Brazil



**Any other suggestions/comments/  
queries?**

**Thank you**

and best of luck for your next season