



# TSNA in Air-Cured and Fire-Cured Tobacco Sub-Group Report

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# TSNA SG History

- ❖ **Group originally formed in 2002, became Sub-Group in 2006**
- ❖ **Membership has gradually decreased from 25-30 to 8-10**
  - **Representatives from tobacco manufacturing companies, universities, and laboratories have participated**
  - **Conduct collaborative studies and create documents related to reduction of TSNA in the tobacco supply chain**
  - **Typically one meeting per year at CORESTA**



## ❖ 6 original objectives

- Subcommittees assigned to address each objective

## ❖ 3 objectives completed or dropped

## ❖ 3 objectives near completion



## ❖ Objective 4:

**Develop a collaborative study which uses data loggers to record curing conditions and possible impact on TSNA levels for tobaccos of diverse origins and curing environments. Attempt to standardize placement of data loggers.**



## ❖ Objective 4 status: 2 experiments conducted

### ➤ **First study conducted in 2008 and 2009 by Virginia Tech and Univ. of TN:**

- directly compare the influence of growing and curing environments
- compare environmental data from data loggers placed on tier rails between tobacco and within tobacco during air-curing of burley.



## Objective 4: Experiment 1

- Results of first collaborative experiment relating to Objective 4:
  - indicated that growing environment (field conditions) also impacts TSNA formation
  - Suggested that at low temperatures, RH has lesser influence on TSNA
- When evaluating TSNA across many environments, too much variability to confirm that higher RH and higher temp always result in higher TSNA.



## Objective 4: Experiment 2

- ❖ **Experiment 2: Analysis of correlation between curing conditions and corresponding TSNA levels at various locations within curing barns**
  - M.S. project for Mitchell Richmond
  - Supported by CORESTA study grant
  
- ❖ **2 barns in KY (Princeton and Lexington) housed with dark air-cured tobacco and 27 data loggers to monitor curing conditions**
  - screened and high-converter tobacco of the same variety (TR Madole)
  - Green leaf samples and soil samples collected prior to harvest
  - Nitrite and TSNA in green leaf, nitrate in soil



## Objective 4: Experiment 2

- ❖ Cured leaf samples of screened and high converter tobacco collected near each meter at takedown for TSNA analysis.
- ❖ Correlation between curing conditions (temp and RH) and corresponding TSNA levels across each barn accessed.
- ❖ Experiment conducted in 2012 and 2013
  - All data collected, final data analysis being conducted
  - Project will be completed with final report by the end of 2014
- ❖ Thanks to CORESTA Scientific Commission for providing study grant to support graduate student project.





## Objective 4

- Draft written on recommendations for placement of data logging instruments in curing structures and given to subgroup members for review.
- Second draft in progress
- Colin Fisher has written draft on use of data loggers and methods for data logger calibration.
- Being reviewed by members



## ❖ Objective 5:

- **Resolve sample handling of post-cure tobacco for TSNA analysis.**
  
- ❖ **Develop protocol for collection, storage, and preparation of post-cure samples for TSNA analysis**

- ❖ **Draft protocol was developed but re-evaluated to include:**
  - **Methods for sampling plants and bales**
  - **Maximum temperatures for air-drying (25 C)**
  - **Additional information for air-drying samples added**
  
- ❖ **2 Revisions developed and reviewed by members**
  - **Final protocol will be submitted to Scientific Commission**
  
- ❖ **Additional new experiment being designed by Colin Fisher to evaluate variability in core sampling procedures of bales.**

## ❖ Objective 6:

- ❖ Review issues of post-cure tobacco storage and ventilation parameters

- ❖ Experiments conducted and manuscript published

- ❖ Significant TSNA responses to high temperature and nitrate
- ❖ Shi, H. et. al. 2013. Changes in TSNA contents during tobacco storage and the effect of temperature and nitrate level on TSNA formation. J. Agric. Food Chem. 61:11588-11594.

- **Also proposed that group should evaluate post cure storage conditions in areas of Africa.**
  - Set of questions developed and information collected from representatives in Malawi.
  - Document will be submitted to Scientific Commission.



- ❖ **Development of general guidelines/best production practices for reducing TSNA in air-cured tobacco**
  - TSNA chapter in KY/TN Tobacco Production Guide used as framework
    - Sent to members to make more of a “global” document.



❖ **Any ideas about new objectives for Sub Group TSNA in air-cured and fire-cured tobacco, submit to Andy Bailey:**

**[abailey@uky.edu](mailto:abailey@uky.edu)**

❖ **TSNA SG website:**

**[http://ces.ca.uky.edu/darktobacco/CORESTA TSNA SG](http://ces.ca.uky.edu/darktobacco/CORESTA_TSNA_SG)**