Burley Curing for Reduced Risk
- Lowering TSNA -

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What are TSNAs?

- Tobacco Specific Nitrosamines
- Nitrogen containing compounds
- Potential carcinogens
- Formed during curing
- Major industry concern
- TSNA reduction a major objective

Formation of TSNA in Curing Leaves

Alkaloid + NO_2^- + Moisture = TSNA

Major Factors Influencing TSNA Accumulation

- Curing conditions
- Nitrogen fertilization
- Varietal differences
  - Nornicotine most important alkaloid in burley TSNA formation
  - LC varieties low in nornicotine

Curing Conditions

- **Most important factor**
- **Low humidity, fast cure = low TSNA**
  - **Low quality from “flash cure”**
- **High humidity, slow cure = high TSNA**
- **Good curing conditions = low to medium TSNA**

Nitrogen and TSNA

- **Higher N Rate = Higher NO_2^- in leaf**
- **Higher N rate may also cause immaturity, high moisture, slow curing**
- **Not as important as LC seed and curing conditions**

UT Burley Curing Research

- Effect of low cost ventilation
- Effect of N rates with ventilated vs high humidity cure
- Greeneville and Highland Rim
- Cooperative with Philip Morris USA

Curing Regimes

- **Ventilated Cure**
  - **Ventilated with ceiling and exhaust fans**
  - **Goal is humidity in low optimal range**
  - **Air flow adjusted based on T and RH of outside and inside air**

- **“Tight” Conventional Cure**
  - **Tight barn**
  - **Ventilation by opening doors**
  - **Goal is high humidity cure**
  - **Just short of barn rot**

Nitrogen Fertilization

- **Low rate (100 lbs N)**
- **Recommended rate**
  - **200 lbs N preplant**
  - **100 lbs N preplant + 100 lbs sidedress**
- **Excessive rate**
  - **300 lbs N preplant**
  - **200 lbs preplant + 100 sidedress**

Yield and Quality HRREC 2006

		Quality	
N Rate	**Yield**	**Vent**	**N Vent**
(lbs N / ac)	**(lbs/ac)**	**-----Gr Index -----**	
100	**2525**	**67**	**66**
200	**2609**	**65**	**66**
100 + 100	**2698**	**63**	**67**
300	**2729**	**65**	**65**
200 + 100	**2696**	**64**	**64**

Ventilation and TSNA - 2006

	Not Ventilated	Ventilated
	----------ppm---------	
Greeneville	2.27	0.88
Highland R.	4.07	3.25

N Rate and TSNA - 2006

	N Rate (lbs ac)		
	100	100 + 100	200 + 100
	----------ppm----------		
Greeneville	0.49	1.20	3.84
Highland R.	2.27	3.53	4.51

Ventilation, N rate and TSNA - 2006

	N Rate (lbs/ac)			
	100		200 + 100	
	Vent	N Vent	Vent	N Vent
	---------- ppm TSNA ----------			
Greeneville	0.43	0.55	1.68	5.99
Highland R	1.96	2.59	3.76	5.26

TSNA by Variety, Cure and N Rate Greeneville 2005

		N Rate (lbs N/ac)	
		100+100	300+100
		----------ppm----------	
KT 204 LC	Vent	1.71	2.91
	N Vent	2.27	3.40
NC 6	Vent	3.15	4.22
	N Vent	4.59	8.08

SUMMARY

- **TSNA reduced by ventilation and lower N**
- **Effect of ventilation greater at higher N rate**
- **TSNA higher at HRREC than at GREC**
- **No effect of ventilation on quality (grade index)**
- **Little yield response to N above 200 lb/ac**