



Collaborative Study of Low Nicotine Tobacco Agronomic Production Practices (LNTP) – Task Force (TF) Report

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Location: Cancun, Mexico

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- **Objectives:**

1. **To determine the impact variety selection has upon nicotine levels.**

- **Genetic impact:** Percentage of difference between low nicotine and standard reference variety

2. **To determine the impact of modified cultural practices have upon nicotine levels**

- **Crop management impact:** Percentage of difference between Local Best Practices (LBP) and Low Nicotine Management (LNM) for low nicotine variety



LNTP – TF Field Experiments

- **Tobacco Varieties:**

- nic1 nic2 deleted low alkaloid (LA) lines
 - Burley (LA TN90, Altria; ITB5101, Bergerac)
 - Flue-cured (LA K326/NCLA 926, NCSU)
- Controls:
 - TN90, K326 and a best locally grown burley and flue-cured variety

- **Treatments:**

- Local best practices (LBP), Low nicotine management (LNM)

- **Data Collection:**

- Yield and Quality
- Nicotine Content: lower stalk, upper stalk



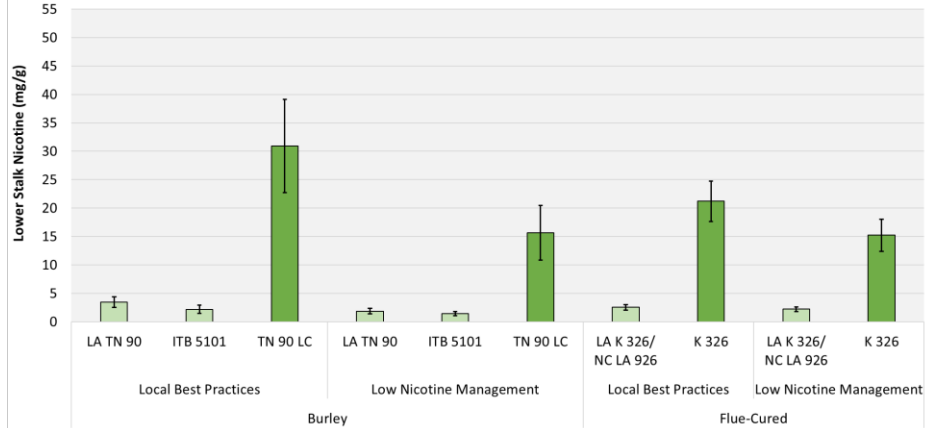
LNTF – TF Field Trial Participants

	Burley	Flue-Cured	PI
1	KT&G, Republic of Korea	KT&G, Republic of Korea	Jeong-Heon LEE
2	Alliance One International, Brazil (2 locations)	Alliance One International, Brazil	Ezequiel de Oliveira / Fernando Wergles
3	Bergerac, France	Bergerac, France	Anna Malpica
4	NCSU, USA	NCSU, USA (2 locations)	Matthew Vann
5	VirginiaTech., USA	Virginia Tech., USA	David Reed
6	University of Tennessee, USA	-	Mitchell Richmond
7	University of Kentucky	-	Colin Fisher
8	Universal Leaf, Philippines	Universal Leaf, Philippines	Teneza, Adelaida (Adel) / Lewis C. Flowers
9	-	Fattoria Autonoma Tabacchi, Italy	Gilberto Milli / Linda Franceschetti
10	Tobacco Research Board, Zimbabwe	Tobacco Research Board, Zimbabwe	Frank Magama / Ralph Ruzane
11	Agricultural Research and Extension Trust, Malawi	Agricultural Research and Extension Trust, Malawi	Albert Chamango
12	Henan Agricultural University, China	Henan Agricultural University, China	Hongzhi Shi

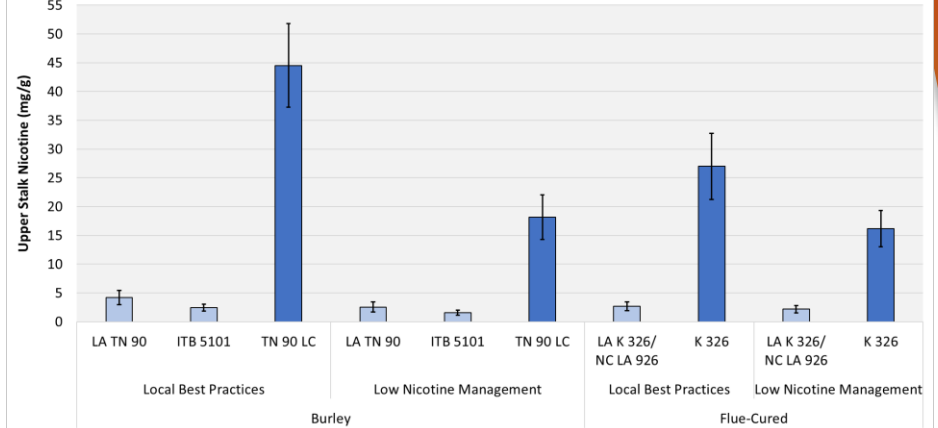


LNTP – TF 3 Years of Nicotine Data

Lower Stalk Nicotine - All Years/Locations Averages (n=14 for BU, n = 20 for FC)



Upper Stalk Nicotine - All Years/Locations Averages (n=14 for BU, n = 20 for FC)



	LBP (mg/g Nicotine)	LNM (mg/g Nicotine)
Burley control	9.7 - 65.4	4.3 - 32.4
LA Burley	0.3 - 6.8	0.2 - 5.7

	LBP (mg/g Nicotine)	LNM (mg/g Nicotine)
Flue-cured control	5.8 – 60.6	4.4 – 28.3
LA Flue-cured	0.7 – 6.5	0.4 – 5.9



LNTP – TF 3 Years of Nicotine Data Summary

		Upper Stalk (Percent Nicotine Reduction)	Lower Stalk (Percent Nicotine Reduction)
Burley	Genetic Impact in LBP	92.6% (3.3 mg/g)	90.6% (2.9 mg/g)
	Agronomic impact of LNM on LA	36.4% (2.1 mg/g)	44.8% (1.6 mg/g)
	Combination of genetic and agronomic impact	95.3%	94.2%
Flue-Cured	Genetic Impact in LBP	90.0% (2.7 mg/g)	88.2% (2.5 mg/g)
	Agronomic impact of LNM on LA	18.5% (2.2 mg/g)	12.0% (2.2 mg/g)
	Combination of genetic and agronomic impact	91.5%	89.6%



LNTP – TF Burley Nicotine by Location Summary

		Bergerac		KT&G		VA Tech.	
		Upper stalk	Lower Stalk	Upper stalk	Lower Stalk	Upper stalk	Lower Stalk
Percent Nicotine Reduction	Genetic Impact in LBP	89%	86%	93%	94%	94%	94%
	Agronomic impact of LNM on LA	34%	30%	56%	30%	31%	36%
	Combination of genetic and agronomic impact	93% (2.9 mg/g)	90% (2.1 mg/g)	97% (0.7 mg/g)	96% (0.7 mg/g)	96% (2.0 mg/g)	96% (1.6 mg/g)

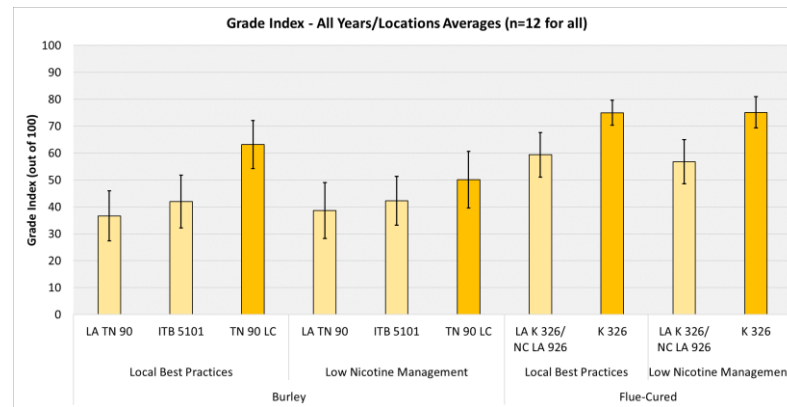
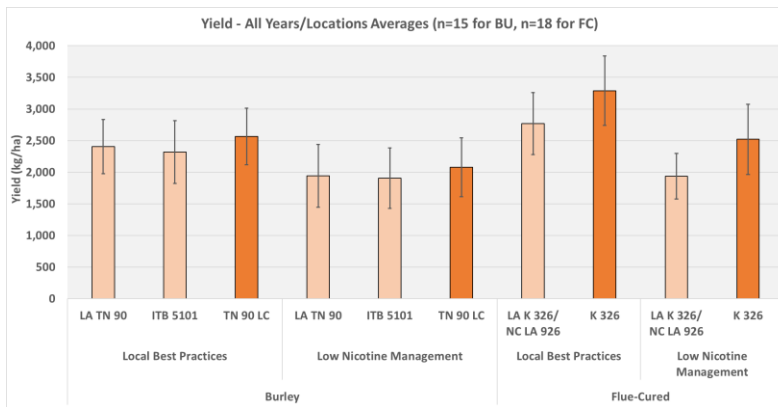


LNTP – TF Flue-Cured Nicotine by Location Summary

		Bergerac		KT&G		NCSU	
		Upper stalk	Lower Stalk	Upper stalk	Lower Stalk	Upper stalk	Lower Stalk
Percent Nicotine Reduction	Genetic Impact in LBP	94%	92%	92%	90%	90%	88%
	Agronomic impact of LNM on LA	34%	-88%	0%	0%	39%	24%
	Combination of genetic and agronomic impact	95% (0.7mg/g)	85% (1.5mg/g)	92% (1.1mg/g)	90% (1.5mg/g)	94% (1.9mg/g)	91% (2.2mg/g)



LNTP – TF 3 Years Yield and Quality Data



- ❖ **Genetic impact:** LA crop reduced an average yield of 8% for burley and 16-23% for flue-cured lines
- ❖ **Crop management impact:** LA crop reduced an average of 19% and 30% of yield in LNM compared to LBP in burley and flue-cured respectively
- ❖ **Combination of Genetic and Crop management impact:** LA crop reduced an average of 25% and 41% of yield in burley and flue-cured respectively
- ❖ The lowest Grade Index in the burley test was observed in LA TN90 and in the flue-cured test in LA K326 grown under low nicotine management



LNTP – TF Burley Yield and Quality Data by Location Summary

		Bergerac	KT&G	UK
Yield (Percent Reduction)	Genetic Impact in LBP	11.6	11.9	-5.6
	Agronomic impact of LNM on LA	9.7	16.9	-7.3
	Combination of genetic and agronomic impact	20.2	26.8	-13.3
Quality Index	Burley control in LBP	59.2	\$7.34	68.7
	Burley LA in LBP	33.1	\$6.35	52.7
	Burley control in LNM	54	\$6.08	68.9
	Burley LA in LNM	40	\$5.75	59.5



LNTP – TF Flue-cured Yield and Quality Data by Location Summary

		Bergerac	KT&G	NCSU
Yield (Percent Reduction)	Genetic Impact in LBP	18.4	26.3	9.1
	Agronomic impact of LNM on LA	28.4	10.7	49.0
	Combination of genetic impact and agronomic impact	41.6	34.2	53.7
Quality	Flue-Cured control in LBP	66.5	\$8.02	84.4
	Flue-Cured LA in LBP	45.6	\$6.97	77.9
	Flue-Cured control in LNM	68.2	\$7.44	82.6
	Flue-Cured LA in LNM	42.7	\$7.36	64.2



LNTP – TF Summary

- **Average lowest level of nicotine in ITB5101_LNM burley (1.2 mg/g) and NCLA 926_LNM (1.7 mg/g) flue-Cured under low nicotine management production practices**
- **In general, 8-30% reduction of yield across all locations and different lines was observed in low nicotine production practices in both burley and flue-cured field studies**
- **Lowest grade index in the burley test was observed in LNTN90 and in the flue-cured test was observed in LA K326 grown under low nicotine management practices**
- **Three years of field studies showed that we cannot achieve the target of 0.3 to 0.5 mg/g of nicotine in nic1nic2 deleted lines**
- **LA lines and low nicotine management practices produced poor leaf quality with reduced yield**



LNTP – TF Future Directions

2-year Plan

- Descriptors for LA leaf to better represent leaf quality
- Complete 4th and 5th year field trails

5-year plan

- Complete chemical analysis of all 5 year's field studies
- Data analysis and publication



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Tobacco Seed

TF Participants

Field Trails

Jannell Rowe (RAI)

Chemistry Analysis

Kenny Lion (Altria)

Data Analysis



Thank You