



Center for Worker Health

Wake Forest School of Medicine

POLICY BRIEF

Prevalence and Prevention of Green Tobacco Sickness among Farmworkers in North Carolina

Summary

Green tobacco sickness (GTS) is acute nicotine poisoning caused by absorbing nicotine through skin contact with the green tobacco plant. GTS symptoms include nausea and vomiting, dizziness, headache, loss of appetite, and trouble sleeping. Farmworkers can recover from GTS without treatment, but it can result in lost work and lost productivity. About 1 in 4 farmworkers gets GTS each year, with farmworkers experiencing 4 days of sickness for every 100 days of harvesting tobacco. Farmworkers harvesting tobacco have high levels of nicotine in their bodies. The risk of GTS can be reduced by limiting farmworker contact with tobacco plants or the water on these plants. Farmworkers should wear water-resistant clothing (e.g., rain jacket), change out of wet clothing, and wash contaminated clothing before wearing it again. Efforts are needed to inform farmworkers, their employers, and health care providers about the actual causes of GTS and how it can be prevented.

Why does it matter?

GTS is acute nicotine poisoning. Nicotine is a naturally occurring alkaloid in tobacco. It is water and lipid (fat) soluble. Tobacco plants or the water on tobacco plants contain nicotine. Direct contact of the skin to tobacco leaves or the water on these leaves results in absorbing nicotine. The primary symptoms for GTS are nausea or vomiting and dizziness or headache. Other symptoms include loss of appetite and trouble sleeping. GTS is very unpleasant, it increases the risk of heat stress and dehydration, and it can cause farmworkers to lose work time. The long-term effects of high nicotine levels are not known.

What did the researchers do?

Since 1999, the researchers have documented the prevalence and incidence of GTS among Latino farmworkers in North Carolina who are employed in cultivating and harvesting tobacco. They have also measured the levels of nicotine among these farmworkers by measuring cotinine in their saliva and urine; cotinine is the primary nicotine metabolite produced by the body.

What did the researchers find?

GTS is common among farmworkers

- 1 in 4 farmworkers working in tobacco gets GTS each year.
- Farmworkers are sick with GTS for 2 days of every 100 days they do any tobacco work; farmworkers are sick with GTS for 4 days of every 100 days they top or harvest tobacco.
- Risk factors for GTS include:
 - Harvesting and topping tobacco
 - Working in wet clothing and conditions
 - Limited work experience



This policy brief is based on several scientific papers listed at the end of this document.

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Farmworkers absorb high levels of nicotine

- Cotinine is the major metabolite that the body produces when it breaks down nicotine.
- Figure 1 shows the increased cotinine in saliva among non-smoking farmworkers across the agricultural season. Cotinine levels increase from 6.6 ng/mL of saliva at the beginning of an agricultural season, to 100 ng/mL toward the end of the agricultural season.

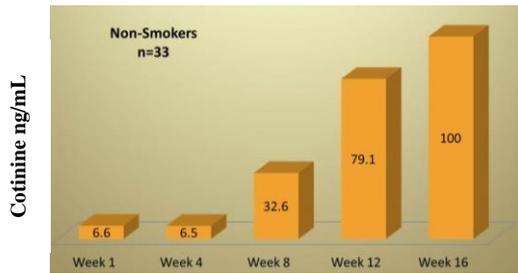


Figure 1. Salivary Cotinine in Nonsmoking Tobacco workers

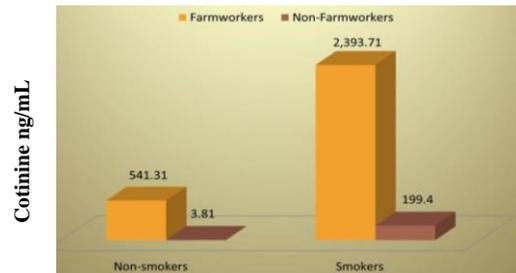


Figure 2. Geometric Mean Urinary Cotinine in Non-smoker and Smoker Farmworkers and Non-Farmworkers

- Cigarette smokers would be expected to have high levels of cotinine. Figure 2 compares cotinine levels in the urine of Latino farmworkers to Latino non-farmworkers who are non-smokers and smokers. The farmworkers who are non-smokers have over twice the cotinine levels in urine (541.31 ng/mL) compared to non-farmworkers who do smoke (199.4 ng/mL). Working in tobacco results in far greater nicotine levels than does smoking tobacco.

Reducing exposure to tobacco or water on the tobacco can help prevent GTS

- Wearing water-resistant clothing (e.g., rain jacket)
- Changing out of wet clothing
- Washing contaminated clothing before wearing it again
- Following field sanitation procedures (e.g., washing hands)

Recommendations

1. Enforce current field sanitation (e.g., hand washing facilities) and housing (e.g., laundry facilities) regulations.
2. Provide farmworkers with accurate information on the causes and prevention of GTS.
3. Ensure clinic and outreach staff have the training and materials to educate workers about GTS.
4. Conduct outreach that provides information to farmworkers that helps them prevent GTS.
5. Train clinicians to recognize and differentially diagnosis GTS.
6. Educate employers about GTS, emphasizing its hazards, effects on worker well-being, and effects on productivity.
7. Require employers to provide appropriate personal protective equipment (e.g., water-resistant clothing) to protect workers from exposure to nicotine.
8. Conduct research on the long-term effects of continued nicotine exposure through the skin.

GTS educational materials are available

- *El Monstruo Verde: La Enfermedad del Tabaco Verde / The Mean Green: Green Tobacco Sickness* are Spanish and English brochures available at <http://www.wakehealth.edu/Research/Family-Medicine/Occupational-Health.htm>
- *Aprenda Sobre la Enfermedad del Tabaco Verde: La Experiencia de Juan/ Learning about Green Tobacco Sickness: Juan's Experience* is a bilingual photonovela available at <http://www.wakehealth.edu/Research/Family-Medicine/Occupational-Health.htm>
- *Monstruo Verde: Enfermedad del Tabaco Verde* is a Spanish language video with English subtitles available at https://www.youtube.com/playlist?list=PLUUComy3IcIIXRoPB_oiHI9USB6c0SPuG

This policy brief is based on data reported in several scientific papers.

- Arcury TA, Quandt SA, Preisser JS, Norton D. The incidence of green tobacco sickness among Latino farmworkers. *Journal of Occupational and Environmental Medicine* 43:601-609, 2001.
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- Quandt SA, Arcury TA, Preisser JS, Bernert JT, Norton D. Behavioral and environmental predictors of salivary cotinine in Latino tobacco workers. *Journal of Occupational and Environmental Medicine* 40:844-852, 2001.
- Arcury TA, Laurienti PJ, Talton JW, Chen H, Howard TD, Summers P, Quandt SA. Urinary cotinine levels among Latino tobacco farmworkers in North Carolina compared to Latinos not employed in agriculture. *Nicotine and Tobacco Research* 18:1517-1525, 2016.