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Effects of Global Warming on Work-Rest Routines for Crop Workers in Appalachia

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Effects of Global Warming on Work-Rest Routines for Crop Workers in Appalachia

4147.0 Effects of Global Warming on Work-Rest Routines for Crop Workers in Appalachia

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Background on ETSU-RMS Community Partnership

- Database of ~1,000 patient encounters at summer field screenings on tomato farms, 2010-present
- CBPR Student projects on ergonomics, heat stress, demographics
- MCN (Rachel Kelley's UCSF-Berkeley) Tomato Workers' Health and Safety: A Guide for Health Care Providers
- "Report Back" Special supplement on farm worker health in El Nuevo Tennessean (2017)

Toward an Early Warning System for Heat Stress

- Does the prevalence of heat stress signs and symptoms correlate with the daily maximum WBGT temperature on farms on the days of the screenings?
- Is there a correlation between the prevalence of heat stress signs and symptoms noted at past summer health screenings (2010-2017) and methods for predicting local WBGT temperatures, in particular the NOAA online calculator?
- Do field measurements with a WBGT instrument on tomato farms correlate with a) the NOAA online calculator; and b) the OSHA-NIOSH Heat Safety Tool App?
- Are diabetics at greater risk of heat stress signs and symptoms?

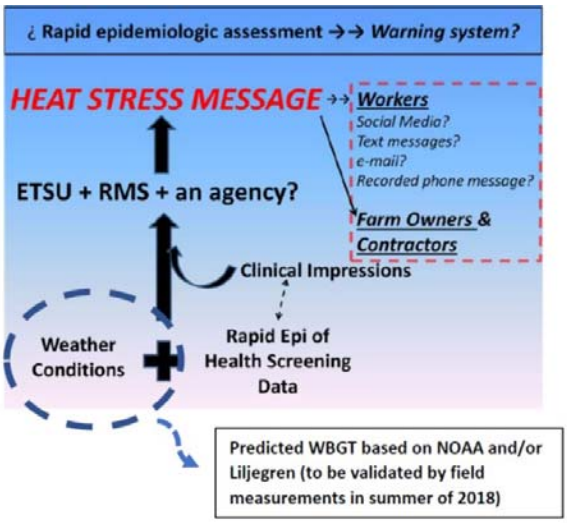

Figure 1. Long-range vision for a heat stress warning system informed by local WBGT and epi data

Bridging Local to Global (IPCC RCP4.5 and RCP 8.5)

- TN, KY and NC highly vulnerable
- Identify select counties ranked high in labor-intensive hand-harvesting of crops (Table 1)
    - Index: Dollars of Payroll/Harvested Acre (2012 Census of Agriculture)
    - Exclude XMass trees, sod, nurseries, beans
- Estimate WBGT in selected counties per Liljegren et al (2008) using NWS data (Table 2)
- Estimate change from baseline WBGT under RCP4.5 and RCP8.5 for selected counties
- How do estimates of elevated WBGTs alter recommended work-rest routines under ACGIH standard?
- Identify data gaps and sources of uncertainty in estimating economic impacts
- Communicate results through the "local color" of the six counties' crops and locations
- Aim for CBPR projects involving other crops and counties

Table 1. Selection of Appalachian Counties on Index of Labor Intensiveness (and Hand Harvesting of a Crop)

	Tennessee	North Carolina	Kentucky
Total Counties	95	100	120
Appalachian Counties	52	29	54
High on Index of Labor Intensiveness	Cocke $86/acre (#1 tomatoes, #8 vegetables, etc.)	Henderson $956/acre (#1 apples; #19 all veggies)	Madison $39/acre (#9 vegetables, etc.)
(& Hand Harvesting)	Clay $36/acre (#4 tobacco)	Polk $241/acre (#6 grapes)	Hart $22/acre (#22 vegetables, etc.; #20 tobacco)

Table 2. Selected Counties' Area and Distance to Nearest Weather Station

	County Seat	Area in km^2 (mi^2)	Nearest Weather Station(s)	Code	Distance to County Seat
Tennessee					
Cocke	Newport	1,147 (443)	Morristown (Hamblen) Greeneville (Green)	KMOR KGCY	18.2 mi 25.9 mi
Clay	Celina	671 (259)	Livingston (Overton)	K8A3	15.3 mi
North Carolina					
Henderson	Hendersonville	971 (375)	Fletcher (Buncombe)	KAVL	9.0 mi
Polk	Columbus	619 (239)	Rutherfordton (Rutherford)	KFQD	15.8 mi
Kentucky					
Madison	Richmond	1,147 (443)	Richmond (Madison)	KRGA	8.5 mi
Hart	Munfordville	1,083 (418)	Glasgow (Barren)	KGLW	17.4 mi

ISSUES OF INTEREST AT ROUNDTABLE

- What are the implications of **differences in scale** (time, geography) between IPCC models and occupational health applications?
- Experiences with **Liljegren's** (2008) method?
- Should a **weather station** within the county be a selection criterion? Only one of the six counties has a weather station. The others are between and nine and 26 miles away
- Are weather station historical data a little spotty when it comes to certain parameters like **dew point** that are needed to estimate WBGT?
- Is there a **climate data "concierge"** who has already compiled data from the many available sources for more rapid use in projects? (Analogy here: Old style phone calls to the NIOSH Technical Information Center)
- In which states have **university extension programs**, which hold a trove of data on crop production, participated in regional studies of climate change and crop production?