



Tomato Workers' Health and Safety

A GUIDE FOR HEALTH CARE PROVIDERS



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Designed by Migrant Clinicians Network



Purpose and Organization of Guide

This guide is intended to be a reference for health care providers who work with people employed in the U.S. tomato industry. It aims to prepare providers with a more detailed understanding of hazards, health issues, and work processes associated with different tomato industry jobs.

This guide draws on published research, experienced health professionals' advice, and information gathered from interviews and focus groups conducted with 36 tomato workers from diverse backgrounds and 14 community leaders familiar with tomato workers' health in multiple states. It is important to note that health and safety conditions at any particular farm or company may vary from what is described here. Furthermore, individual workers may experience the same set of conditions differently.

The first section of the guide focuses on health hazards and health conditions commonly encountered in tomato production. The second section consists of detailed descriptions and illustrations of different tomato production tasks. The third section covers "human resources" information and policies that apply to U.S. agricultural workers generally. The appendices contain a Spanish-English glossary, further detail about different types of pesticides, information about agricultural occupational health policies and regulation, and a list of resources and readings.

If you have suggestions for how to improve this guide, please contact Rachel Kelley at tomato.worker.health@gmail.com.



Executive Summary

Fresh tomato production is a highly labor intensive process. Grocery shoppers may not think about it, but someone handpicked every tomato sitting in the produce section. That person may have also done a number of other jobs involved in tomato production, including preparing the soil, placing tomato plants, hammering stakes, and tying twine supports. Each of these jobs requires a great deal of physical exertion in hot, sunny fields.

In general, tomato workers' occupational illnesses and injuries arise from exposure to one or a combination of the following hazard categories: extreme heat, risky physical postures and movements, poor hygienic conditions, chemical exposures, and psychosocial stressors. These hazards can cause health problems ranging in severity from minor discomfort to life threatening. Many of these hazards and health problems are common to most U.S. agricultural workers. Others – notably extended periods of stooping and frequent exposure to a variety of pesticides – are particularly relevant to tomato workers.

A number of medical and workplace interventions can help protect tomato workers' occupational health. Many such interventions may seem very simple, such as providing cool water, clean bathrooms, personal protective equipment, adequate rest breaks, and affordable health care services to workers. Others have yet to be designed or widely implemented, such as harvest aids that could reduce the amount of stooping or lifting that workers generally do as part of their jobs.

Significant challenges to implementing such interventions exist, including lack of employee and/or employer awareness, vulnerabilities due to immigration and employment status that hinder incident reporting, limited enforcement of workplace safety standards, and agricultural economic dynamics.

With an improved understanding of the hazards and health problems faced by tomato workers, health and social service professionals can improve the services they provide to clients, as well as contribute valuable insight to public deliberations about how to improve agricultural worker health and safety in the U.S.

Occupational Hazards and Health Impacts

There are two primary work environments in the tomato industry – the fields and the packing house. Both currently expose workers to a number of health hazards.

Heat Hazards

Field workers

- Field workers do their jobs in the fully sunlit fields required for optimal tomato plant growth. Average high temperatures range from the mid-80's to high-90's (29-37°C),¹ and humidity can be up to 90% in some regions.²
- In many regions, crews must wait for the morning dew to evaporate before beginning work.¹ This results in working during sunnier and hotter times of day.

Packinghouse workers

- Packinghouses are typically open to the outside and do not have air conditioning. Certain – usually larger – packing operations do have air conditioning.
- Some packinghouses may have part of their operations located in warehouse lofts, where temperatures can be several degrees hotter than on the main floor.



¹ The main reason to waiting for dry fields is that tomatoes and tomato plants are more prone to damage when wet, and tomatoes will spoil more quickly if harvested while wet.

Descriptions of heat hazards - in tomato workers' own words:

“All this heat doesn't let them rest. So much heat. We see people get dizzy and fall there [in the fields].”



“You can't eat much because you're very tired, very hot, and running. And once it is time to eat lunch, well, you can't eat much because you're agitated and tired.”



“[The supervisors] many times they pressure us to do another load, another trailer...and if we can't stand the heat anymore, because it's above 100 degrees, many coworkers go to the shade. And the [supervisors] say: “Get up! Get going!” and well the person can't resist [the supervisor's demands]. The supervisor tells the mayordomo: “You know what? Don't bring me these people tomorrow.” So that's what we encounter there in the fields. Sometimes the supervisor and mayordomo ignore us, and in doing so, they put our health at risk, right, our health - when they demand of us more than what we should do.”



“People have told me that before the bosses were stricter, that they didn't even let people rest, that they had to work every day. That's what they've told me, but I've hardly experienced that.”



“There are companies that have areas to rest for when it is hot. Or you can say to the supervisor, “You know what, it is really hot,” and you can go to rest, and yes, he will give you permission to go and rest - in other words, a break.”

Heat Related Illnesses^{3,4}

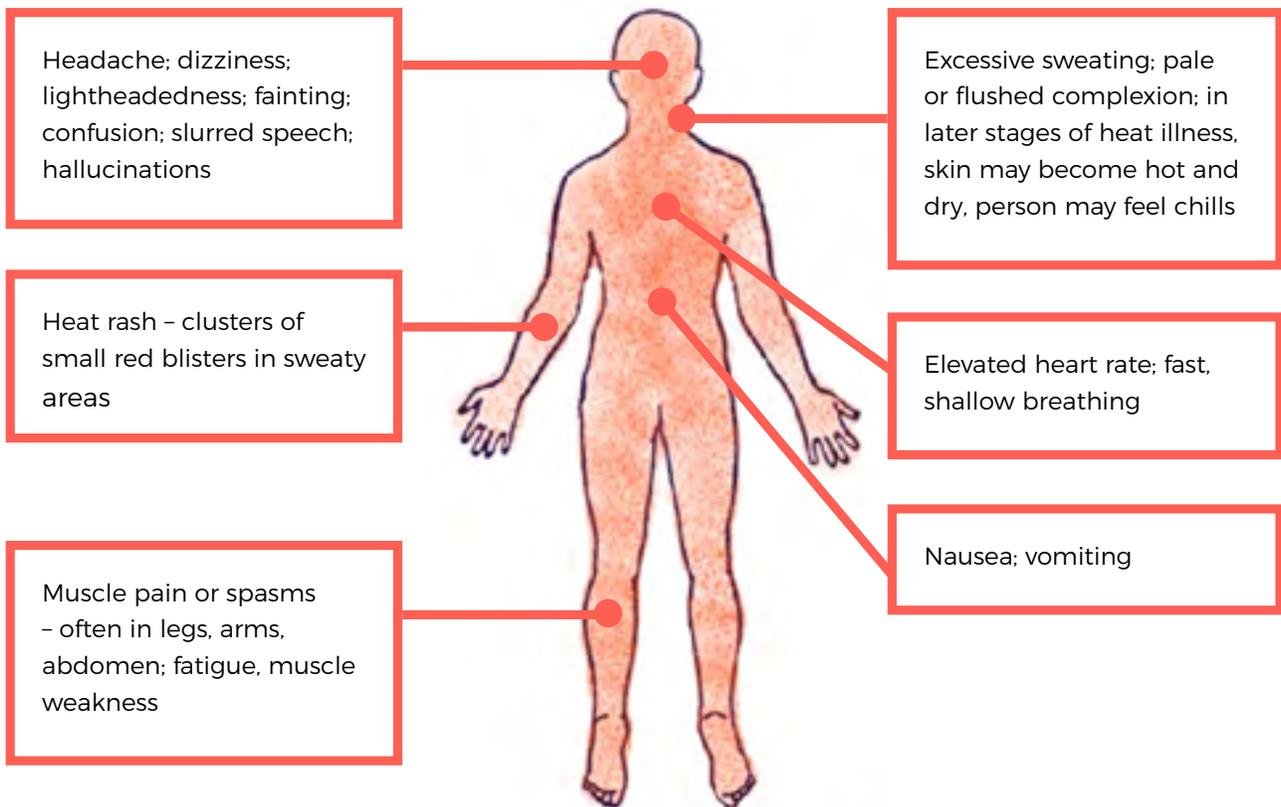
Including the following diagnosable illnesses: heat rash, heat syncope, heat cramps, heat exhaustion, and heat stroke

- **Heat stress agents**

- ◇ Ambient air temperature
- ◇ Wind velocity
- ◇ Relative humidity
- ◇ Mean radiant temperature
- ◇ Clothing insulation
- ◇ Metabolic heat production

Heat-related illness can be fatal. Workers may or may not feel less serious symptoms before suffering more serious symptoms of heat exhaustion and heat stroke (elevated body temperature; confusion, dizziness, or hallucinations; profuse sweating or dry, hot skin).

Heat-Related Illness Symptoms

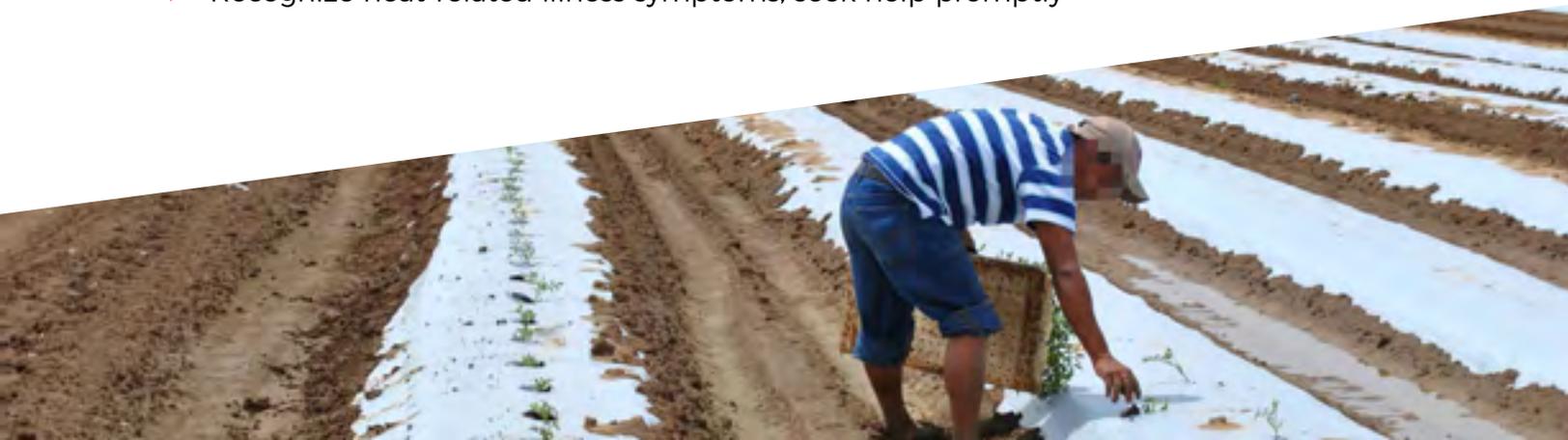


Risk Factors

- **Workers at increased risk are those who:**
 - ◇ Work in the heat and/or direct sunlight
 - ◇ Experience high levels of physical exertion
 - ◇ Wear insulating clothing (e.g. personal protective equipment required to apply pesticides)
 - ◇ Haven't adjusted to heat - new workers, start of season
 - ◇ 65+ years old or overweight
 - ◇ Have heart disease or high blood pressure
- **Work organization that makes it difficult for workers to maintain sufficient fluid intake and take cooling breaks**
- **Dehydration**
 - ◇ Alcohol, caffeinated soda, and energy drinks are diuretics

Prevention

- **Work organization: Employers should ...**
 - ◇ Require new workers, especially new arrivals in the U.S., to 'acclimate' to hot weather by gradually increasing the number of hours they work daily
 - ◇ Ensure easy access to shade, cool water, and bathrooms
 - ◇ Schedule and encourage frequent rest breaks for all workers
 - ◇ Create plans for heat-related emergencies and ensure that all workers know how to get help
- **Health habits: Workers should...**
 - ◇ Wear hats and clothes that are light-colored and breathable
 - ◇ Avoid alcoholic or caffeinated beverages
 - ◇ Drink plenty of fluids
 - ◇ Replenish electrolytes with nutritious food and/or sports drinks
 - ◇ Recognize heat-related illness symptoms; seek help promptly



Treatment Considerations

- **Heat exhaustion and heat stroke are life-threatening emergencies!**
- **Co-workers and supervisors should be ready to give first aid:**
 - ◇ Move affected workers to a cool, shaded place; give water to drink; allow rest. Consider applying cool wet cloths. Call 911 if they have altered mental state or hot, dry skin.
- **Workers who have suffered non-fatal heat strokes may need extended recovery time. If unable to work, they may need help securing alternative ways of providing for themselves and their families.**

Prognosis

- If untreated, high temperatures can damage organs, cardiovascular and nervous systems, which may lead to disability or death.
- With prompt and appropriate treatment of heat-related illness, workers can make a complete recovery.

Resources

- “Heat Illness Prevention: Training Materials for Educators” - http://deohs.washington.edu/pnash/heat_illness
- “Heat-Related Illnesses” report from Migrant Clinicians Network and Farmworker Justice http://www.migrantclinician.org/files/resourcebox/heat_monograph.pdf
- Water, Rest, Shade Campaign Educational Resources from Cal/OSHA - <http://www.99calor.org/educational-resources>



Musculoskeletal Hazards⁵

Most tomato production jobs expose workers to a variety of musculoskeletal hazards, including combinations of the following:

- Prolonged stooping
- Repetitive movements
- Heavy lifting
- Lifting with awkward body positions
- Asymmetrical weight loads
- Bent or twisted backs
- Uneven and/or slippery ground leading to falls, sprains

Descriptions of musculoskeletal hazards - in tomato workers' own words:



“Being stooped over all day hurts you. When it's time to get up, you get up with back pain. There are times when you say, “I think that I won't be able go pick right now.”



“Imagine - when you carry the bucket you carry two, one on each side. You arrive to where the dump is where you have to lift [the buckets]. You have to lift all that. It hurts your shoulders, your arms, all that. And it's the pain that hits us more often.”

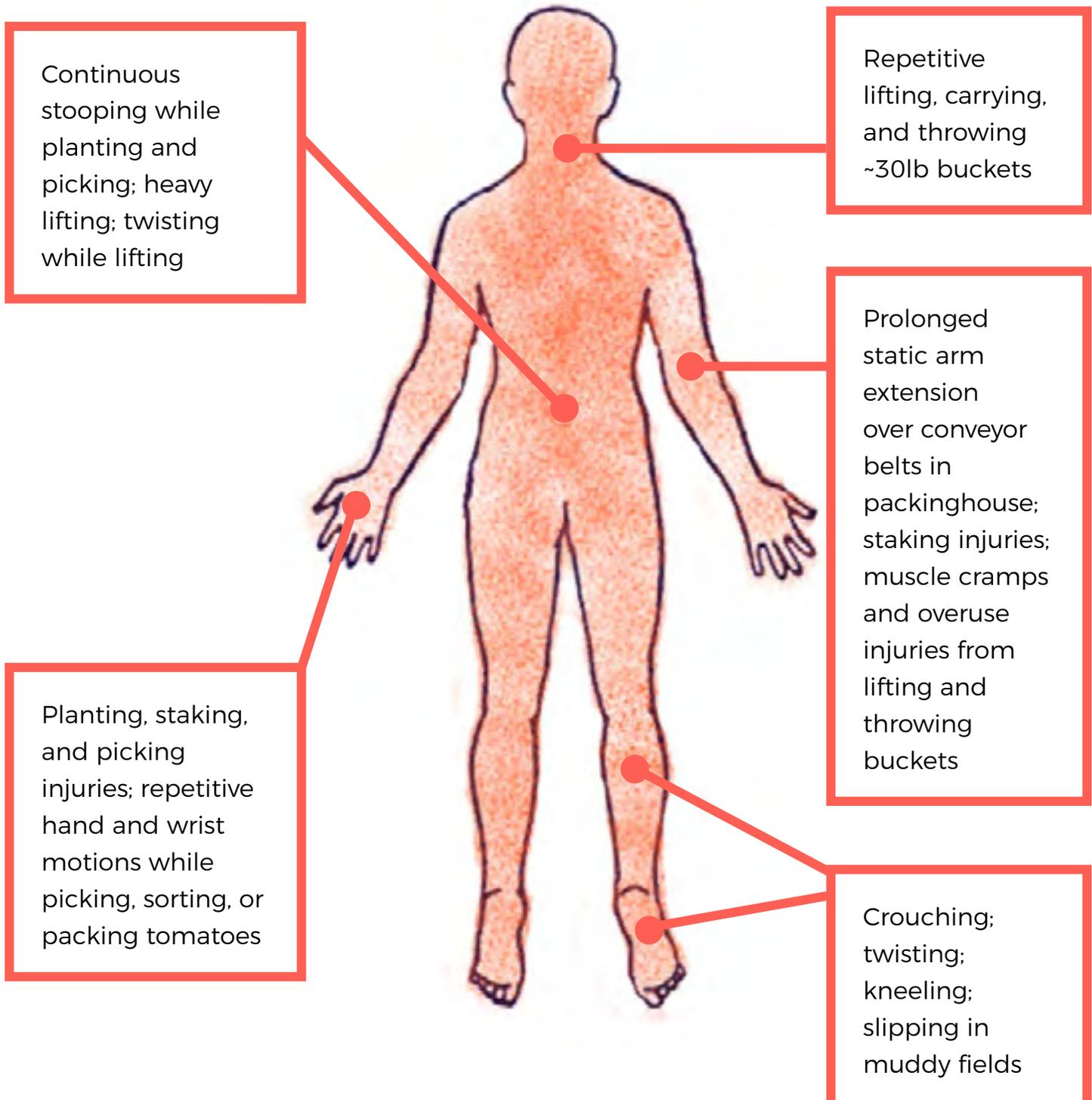


“Sometimes, for example, we carry the bucket all day, and we're going to bring in the bucket [to the collection truck] and suddenly a cramp seizes us in the arm, and that's when we lose strength because it can give you a cramp in your hand just like that - it's strong.”

Musculoskeletal Injuries

Injuries affecting the nerves, tendons, muscles, joints and supporting structures of the musculoskeletal system

Injury Sites & Causes



Risk Factors

- Highly impacted jobs: all field workers, most packing house workers
- Lack of rest breaks; repetitive motion; heavy lifting; stooping
- Prior musculoskeletal injuries

Prevention

- **Work organization: Employers could ...**
 - ◊ Ensure adequate rest breaks
 - ◊ Rotate job tasks to reduce harm from repetitive motion (e.g. ensure that workers are not repeating the same motions all day)
- **Ergonomically designed harvest aids**
 - ◊ Mechanical lifts could reduce risky bucket throws and catches
 - ◊ Bucket carrying aids could reduce risky lifts and carries
 - ◊ Braces could redistribute weight away from vulnerable back muscles and spinal column
- **Ergonomically designed packing house equipment:**
 - ◊ Anti-fatigue mats or other cushioning on concrete floors where packers and sorters stand
 - ◊ Adjustable height foot stools or chairs would reduce arm extension, particularly for short individuals
- **Health education about safer lifting techniques, stretches, and exercises**



Treatment Considerations

- **Alternative “light duty” jobs that allow injuries to rest and heal:**
 - ◇ Discontinuing physical labor entirely is not an option for most workers
 - ◇ Anti-inflammatory medication
 - ◇ Stretching and muscle strengthening exercises
 - ◇ Currently, costly imaging and surgeries are logistically and financially out of reach for most workers

Prognosis

- **Musculoskeletal damage can contribute to the development of other serious health concerns, including:**
 - ◇ Chronic pain
 - ◇ GI damage associated with heavy use of anti-inflammatories
 - ◇ Permanent physical disability leading to loss of employment, loss of livelihood, and mental health concerns
 - ◇ Subacute musculoskeletal injuries decrease strength and flexibility, which lowers the threshold of exertion that workers can safely maintain. This raises the risk of additional injury.

Resources

- “¡Cuídate!” Patient Education for Musculoskeletal Injury Prevention - <http://www.migrantclinician.org/toolsource/resource/¡cuídate.html>
- “Ergonomic Guidelines for Manual Material Handling” - <http://www.cdc.gov/niosh/docs/2007-131/pdfs/2007-131.pdf>
- Soluciones simples: Soluciones ergonómicas para trabajadores agricolas” - https://www.cdc.gov/spanish/niosh/docs/2001-111_sp/pdfs/2001-111sp.pdf



Hygiene Hazards

Most fields have no source of potable running water or permanent restroom facilities. Therefore, workers rely on portable tanks for hand-washing and portable toilets. Workers report that field bathroom facilities are often – though not always – far from the worksite or poorly maintained. For example, water, paper towels, and toilet paper may run out without being promptly replaced and toilets may fill up and become dirty before their scheduled cleaning. Fast-paced, crew-based work systems can make it difficult to take a bathroom break. For more information on such work organization, refer to the section on Work Organization, which begins on page 28.

Descriptions of hygiene hazards – in tomato workers' own words:

“For those that work in the fields, many times there isn't even water to wash your hands when you're going to eat. Sometimes the bathrooms are those that they bring there – those boxes. Sometimes, there's not even paper, there's not a place to wash ... This happened to me and so that's why I'm saying it, it's like you feel like you're really low (degraded) ... In that way someone feels mistreated – because the necessities that a person needs aren't there.



“There are companies that don't even want to buy toilet paper to put in the bathroom. Well, you get there – people suffer. Sometimes there is a roll of [paper towels], and since there isn't toilet paper, well people use the [paper towels]... It's more rough, and since you're working, well, all those areas are more sensitive because you're sweating, so if you do that, it's really easy to have chafing and your skin turns red.



“Sometimes there isn't water and, sometimes you just eat like that, or with a spoon. Sometimes it's better not to bring tortillas and just eat dry food with a spoon. Also because of the fear of getting sick. It's nasty.



Skin Disorders⁷⁻¹⁰

Common skin disorders among agricultural workers include: pustular eruptions, lichenified hand dermatitis, keratosis pilaris, toenail fungus, and conjunctival erythema.

Risk Factors

- **Workers at increased risk are those who are exposed to:**
 - ◇ Sun, heat, and/or moisture
 - ◇ Agricultural chemicals
 - ◇ Allergens (which can include tomato products)
 - ◇ Poisonous plants or insects
 - ◇ Poor hygienic conditions
 - ◇ Wet shoes, socks and feet

Prevention

- **Gloves and long-sleeved shirts**
 - ◇ Due to heavy use, protective clothing may wear out quickly and workers may not be able to afford replacements. Employers or health organizations can ensure that all workers are better protected by providing protective equipment.
- **Accessible washing stations**
 - ◇ Stations should always be well stocked with soap and water. Supplies for emergency skin and eye flushes should be accessible and in compliance with the EPA Field Sanitation Standard (see Appendix III).
- **Safe chemical handling and storage**
 - ◇ Employers should provide training, materials, and communication methods and enforce workplace procedures necessary to protect workers from chemical exposure (see Appendix III).
- **Hygienic housing conditions, including access to showers and laundry**

Treatment

- Treatment can improve health and quality of life by removing a source of pain, itching, and/or disturbances of sleep, self-esteem, and social life.

- Workers might not seek care for skin disorders, so health care providers may consider screening for or treating skin disorders when workers present to clinic with other health concerns.

References

- Skin Conditions” by Farmworker Clinical Care Resource - <http://farmworkercliniciansmanual.com/index.php/common-health-conditions/skin-conditions/>
- Review article: “The prevalence and possible causes of contact dermatitis in farmworkers” - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3667697>



Chemical Hazards

Commercial fresh market tomato production uses chemical agents to treat the soil before planting, to treat tomato plants and fruit during the growing season, and to clean and treat equipment and tomatoes in the packing house.¹¹ The U.S. tomato industry uses comparatively more chemical agents than many other U.S. crop industries.¹² This is partially due to the wide variety of pests that can affect tomatoes.¹¹

Pesticide Related Illnesses¹³

Pesticides used in the tomato industry can cause acute or chronic damage to a variety of physiologic systems through a range of mechanisms. Pesticide use varies by season, region, and company. For more information, consult Appendices II and III.

Potential Effects* of Pesticide Exposure¹³

*Pesticides have different effects depending on the chemical and exposure. Not all pesticides cause all the effects listed below.

Routes of Exposure¹³

Location	Example
Mouth	<ul style="list-style-type: none"> Accidental ingestion (e.g., contamination of food or water); deliberate ingestion (e.g., suicide attempt);
Lungs	<ul style="list-style-type: none"> Inhalation of airborne droplets while preparing or applying chemical mixture, or while at work near pesticide application (e.g., "pesticide drift")
Skin	<ul style="list-style-type: none"> Spills of concentrated chemical onto skin or clothing Exposure to residues on treated plant products, tools, etc.
Eye	<ul style="list-style-type: none"> Splashes into the eye while preparing or applying chemical Airborne droplets enter eye while at work near pesticide application
Family Contact	<ul style="list-style-type: none"> Children and other family members exposed to work clothes and shoes contaminated with pesticides.

Nervous system injury:

- Headache
- Dizziness
- Tingling (parathesias)
- Altered mental status
- Tremors
- Seizures
- Coma

Acute and chronic exposures may cause lasting damage to nervous system and/or mental function.

Heart and/or lung tissue damage may be acute or accumulate over time. Severe exposures may disrupt heart or breathing

Skin problems, including: blistering, itching, peeling, and/or painful rashes

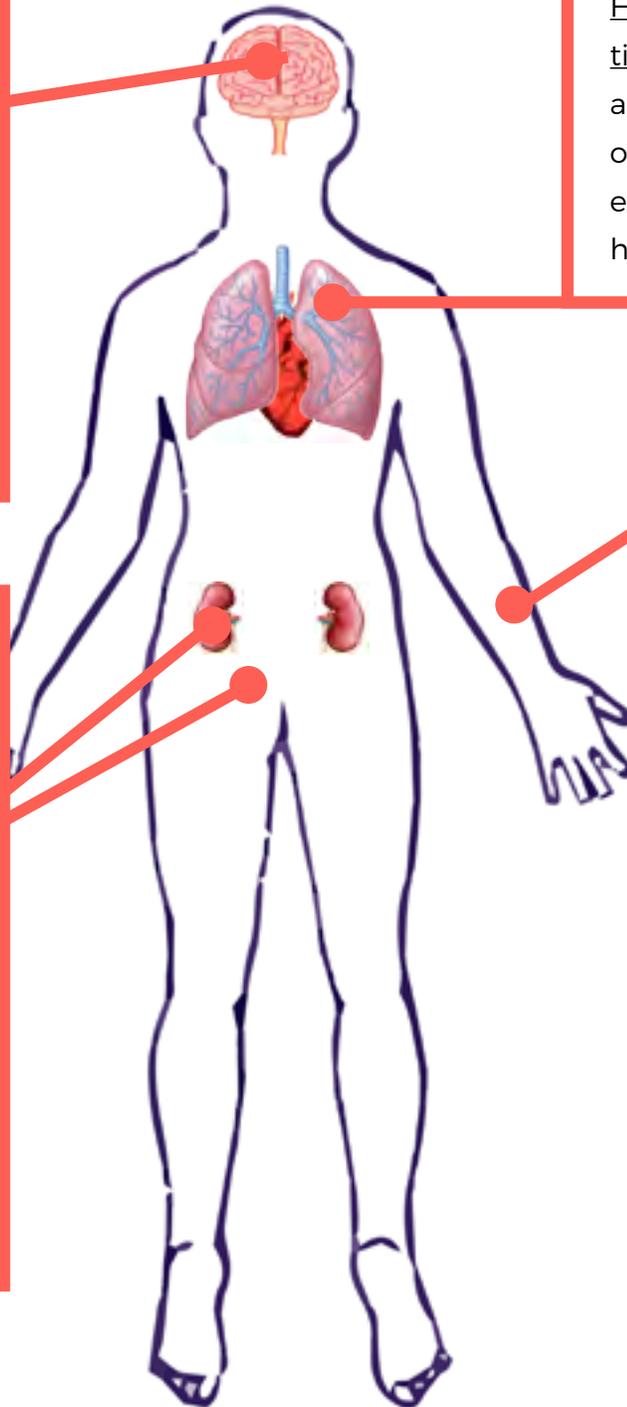
Endocrine disruption:

- Problems with sexual and reproductive development
- Increased cancer risk

Fertility problems:

- Abnormal fetal development leading to miscarriage or developmental disabilities
- Associations with sperm production problems and male infertility⁴⁷

Increased risk of certain cancers, including: leukemia, pancreas, kidney, prostate and breast cancer

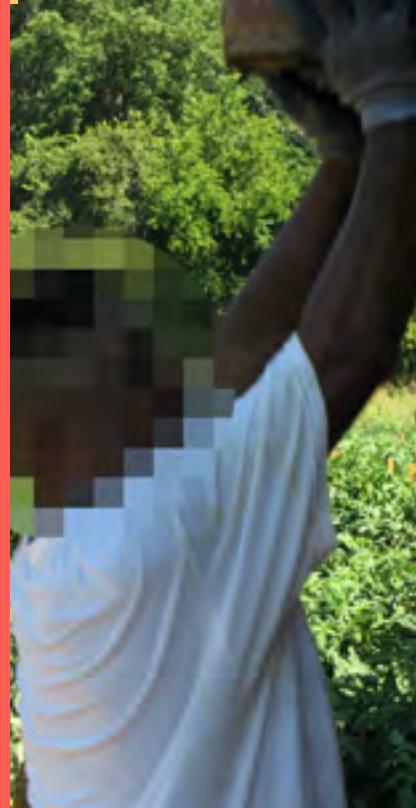


Descriptions of common instances of pesticide exposure - in tomato workers' own words:

“When you pick, you move the whole tomato plant, and a lot of dust comes up, and all the chemicals that they had put on it. So when you're showering and you blow your nose, everything comes out green, black from inside of your nose. And your whole face is green, your hair is green, everything is green. And you feel scratchiness in your throat when you swallow.



“When they spray, they apply a certain chemical that should be put there for certain hours - 8 hours, 10 hours, or 24 hours. But sometimes the bosses don't respect that and they have you place twine or pick. In other words, they go around disregarding the schedule that you have to follow for the spray, so they can put people [in the fields]. Sometimes there isn't respect for the worker.



“They take more care now. Before since there wasn't so much vigilance - so yes, before they took advantage [of workers] more. Also sometimes there was ignorance of how much [the pesticide] harmed [people]. Now there is a lot of supervision, I think, because where I work, if my boss fumigates something, he doesn't let us enter there. He doesn't even let us pick or eat anything.



“So much itchiness... I don't know how I do it, but I always leave [the fields] smeared [with tomato debris]... A lot of pesticide stays with me because in the afternoon my breasts itch a lot.

Pesticide Related Illnesses¹³

Risk Factors

- **Workers at increased risk are those who:**
 - ◇ Handle pesticides or cleaning chemicals
 - ◇ Work in or near areas being treated with chemicals
 - ◇ Do not have personal protective equipment (PPE) or do not use PPE properly; lack training in pesticide safety
 - ◇ Handle chemically treated material (e.g., tomato plants, plastic mulch)
- **Workplace noncompliance** with legally required restricted-entry intervals, sign posting, PPE use, availability of hand-washing and eye-flushing supplies, and notification of employees about time, location, and type of pesticide application.

Prevention

- **Work organization: Employers should ...**
 - ◇ Ensure access to personal protective equipment and washing stations
 - ◇ Provide all employees with thorough pesticide safety training
 - ◇ Discontinue use of harmful pesticides whenever possible
 - ◇ Abide by safe pesticide use and storage instructions
 - ◇ Create plans for pesticide-related emergencies. Ensure all workers know how and when to get help
 - ◇ Make Safety Data Sheets available to workers and supervisors in a convenient location
- **Worker habits: Workers should ...**
 - ◇ Wear personal protective equipment
 - ◇ Abide by safe pesticide use and storage instructions
 - ◇ Not enter treated fields during post-treatment “restricted entry intervals”
 - ◇ Wash hands before eating
 - ◇ Change into clean clothes, shower, and wash pesticide-exposed clothing as soon as possible after work
 - ◇ Recognize pesticide-related illness symptoms; seek help promptly

Treatment

- **Remove** source of exposure and contaminated clothing

- **Decontaminate** exposed areas by flushing with lots of water and washing away oily substances with soap.
- **Provide medical assistance**, including first aid and professional medical attention as appropriate. Treatment varies greatly by type of exposure. Consult Recognition and Management of Pesticide Poisonings (cited below) for more information on diagnosis, treatment, and reporting.

Prognosis

There is increasing evidence that chronic exposure to certain pesticides, even at low doses, can lead to cancer, endocrine disruption, neurological and psychological problems, and asthma. Children are particularly vulnerable to these effects. Children can be exposed to pesticide residues in the home through parents' clothing or living and playing near treated fields.

Resources

- Roberts, J., & Reigart, J. R. (2013). Recognition and management of pesticide poisonings. (6th ed.). Washington DC: Office of Pesticide Programs, U.S. Environmental Protection Agency. Retrieved from www2.epa.gov/pesticide-worker-safety
- "Pesticide Exposure Clinical Guidelines and Assessment Form" - <http://www.migrantclinician.org/toolsource/tool-box/pesticide-clinical-guidelines.html>
- Pesticide Education Manuals for Community Health Workers and Promotoras - <http://www.migrantclinician.org/toolsource/resource/little-bit-poisonwill-it-kill-you-poco-veneno...no-mata-pesticide-education-manual->
- Pesticide Training Manual - <http://www.migrantclinician.org/toolsource/resource/aunque-cercasano-pesticide-training-manual.html>



Psychosocial Hazards¹⁴⁻²¹

More information about some of the psychosocial hazards in this section may be found in a 2008 U.S. Senate Committee Hearing titled “Examining Ending Abuses and Improving Working Conditions for Tomato Workers.” The text of the hearing is freely available online.⁴⁸

- **Crew labor system**

- ◇ Most workers are usually supervised by a crew leader. They may depend on their crew leaderⁱⁱ for transportation, housing, employment and/or payment of wages. Specific arrangements vary by crew and company.¹⁷
- ◇ Workers may continue working for abusive crew leaders if they do not have access to alternative sources of livelihood.¹⁴⁻¹⁸
- ◇ Working in a group of people and under close supervision can pressure individuals to forgo breaks or work more quickly than they can healthily sustain.

- **Wage Payment Systems**

- ◇ A variety of tasks are paid by “piece” of work completed (e.g. number of buckets harvested) rather than by hours worked. This creates pressure to work rapidly.²²
- ◇ Hourly workers also experience pressure to work rapidly to meet supervisors’ production expectations.

- **Vulnerabilities due to immigration status**

- ◇ About half of U.S. farmworkers are undocumented.²³ A small percentage of workers have temporary agricultural guestworker visas (H-2A) that are only valid for employment with the sponsoring employer. A number of regulations are meant to protect H-2A workers’ health and safety, though there are significant problems with enforcement.¹⁷

- **Sexism and racism**

- ◇ Multiple studies have found that violence against women, immigrants to the U.S., and people from indigenous Latin American backgrounds is common in agricultural industries throughout the U.S.^{14-16,18}

- **Limited legal protections**

- ◇ Farmworkers are specifically excluded from a number of protective labor laws¹⁹ For more information, refer to Appendix III.
- ◇ Enforcement of existing worker protections varies by state. Many labor enforcement agencies investigate workplaces only after receiving a complaint.

ⁱⁱ Many crew leaders are legally considered “Farm Labor Contractors,” people “who, for money or other valuable consideration paid or promised to be paid, recruits, solicits, hires, employs, furnishes or transports migrant and/or seasonal agricultural workers.”²⁴

◇ Workers may not report workplace abuses due to precarious employment, vulnerable social situation, or not knowing their rights.

• **Debt and human trafficking**

- ◇ Some workers may be working to pay off debts – which may be legitimate or illegitimate – to their crew leader or to people in their countries of origin.
- ◇ Victims of trafficking may be held against their will and forced to work on the premise that they owe traffickers money. Traffickers inflict violence on victims and/or victims’ families and property in the U.S. or home country.¹⁷
- ◇ Florida, the leading state of the fresh market tomato industry, has been described as the “ground-zero of modern slavery.”²⁵ In recent years conditions have been improving due to the efforts of workers and community organizations in collaboration with employers, law enforcement, and public leaders.²¹

• **Low income**

- ◇ Limited income from either low wages or periods of unemployment between seasons can impact workers’ ability to meet their own and their families’ needs.

Descriptions of psychosocial hazards – in tomato workers’ own words:

“Coworkers say that there is always discrimination there on the farms, always.... People don’t want to say so because they are afraid, because if the mayordomo finds out, they will lay them off them later. And then they will fire them. There are times when people need the money, so they want to work. That’s why [the bosses] take advantage of them. “I will endure,” they say...That’s how I endured the fields. I endured until the last day, when finally no, no more.

“Half an hour for lunch – but since [they’re working] by contract, they just eat and go... because you have to hurry up to earn [money].

“Sometimes the bosses take advantage because they say, “Well, they don’t have anywhere to go, and they will put up with a lot.”

“In Florida, [docking pay if a worker takes time to go to the bathroom] almost doesn’t happen anymore, because the companies’ systems changed – because now for example, when you start, they give you a card and they punch it for you, and there it tells you when you started, and it runs until you leave work in the afternoon. Before they did this, they cut back the time because they didn’t give us a card to punch.

“There are more rules, but sometimes even though the rules are there, they don’t follow them. Nobody wants to say anything because there is the threat that if I say anything, then they aren’t going to bring me back. There’s always this threat. Always, always. Yeah, sometimes you’re afraid to speak.

- **Workers at increased risk for illness or injury due to increased vulnerabilities include:**
 - ◇ Inexperienced workers who are not conditioned to physically strenuous work in hot weather
 - ◇ People of shorter stature (e.g. women, adolescents) may face increased ergonomic risks from using tools and equipment designed to fit taller people
 - ◇ Socially marginalized identities (e.g. indigenous ethnicities, LGBT, people with disabilities)
 - ◇ Women, adolescents, and elders

Mental Health^{26,27}

Risk Factors

- **Workers at increased risk may experience ...**
 - ◇ **Interpersonal violence**^{16-18,25}
 - » Including sexual violence and witnessing violence against others, either in the past or present
 - ◇ **Isolation and lack of social support**
 - » Exacerbated by potential language barriers, lack of transportation, frequent moves, and lack of free time to connect with friends or family
 - ◇ **Chronic stress**
 - » Including the psychosocial stressors discussed on pages 23-24.
 - ◇ **Substance use and abuse**
 - » Some people may use stimulants to boost energy at work and/or depressants (alcohol) in the evenings, either recreationally or in response to stress or addiction.
 - » To avoid losing time from work, some people may take over-the-counter or prescription painkilling medication.
 - ◇ **Sleep deprivation**
 - » Some people may work as late as midnight in some packinghouses. Night shift work sometimes follow a day of work in the fields or packinghouse. Housing conditions (such as sharing with multiple people, lack of air conditioning, or insect infestations) may disrupt sleep.

Prevention & Treatment

- **Employer policies and practices can be implemented that...**
 - ◇ Prevent and take disciplinary action against workplace violence, including sexual harassment and racial slurs.
 - ◇ Track hours and/or pieces of work using a system that both workers and employers can access and trust.
 - ◇ Ensure more predictable work hours and adequate rest breaks.
 - ◇ Guarantee a set timeframe of employment and clearly communicate policies regarding termination of employment.
- **Maintain contact with friends and family members**
 - ◇ Employers or health/social service providers can help workers to access phone and internet services
 - ◇ Community organizations can sponsor social activities that could help workers connect with new or complementary sources of social support
- **Supportive community organizations may connect people with acute counseling services.**
 - ◇ With growing support for acute and short-term mental health services at community clinics, some services may become more available.

Resources

- “Trauma-Informed Care in Behavioral Health Services”? Treatment Improvement Protocol by SAMHSA - <http://store.samhsa.gov/shin/content//SMA14-4816/SMA14-4816.pdf>
- Research article: “Migrant Farmworker Stress: Mental Health Implications” - http://dev.cpc.org/cpc/asset/File/Policy-and-Advocacy/Active-Policy-Issues/MSFW/MSFW_Migrant_Farmworker_Stress.pdf



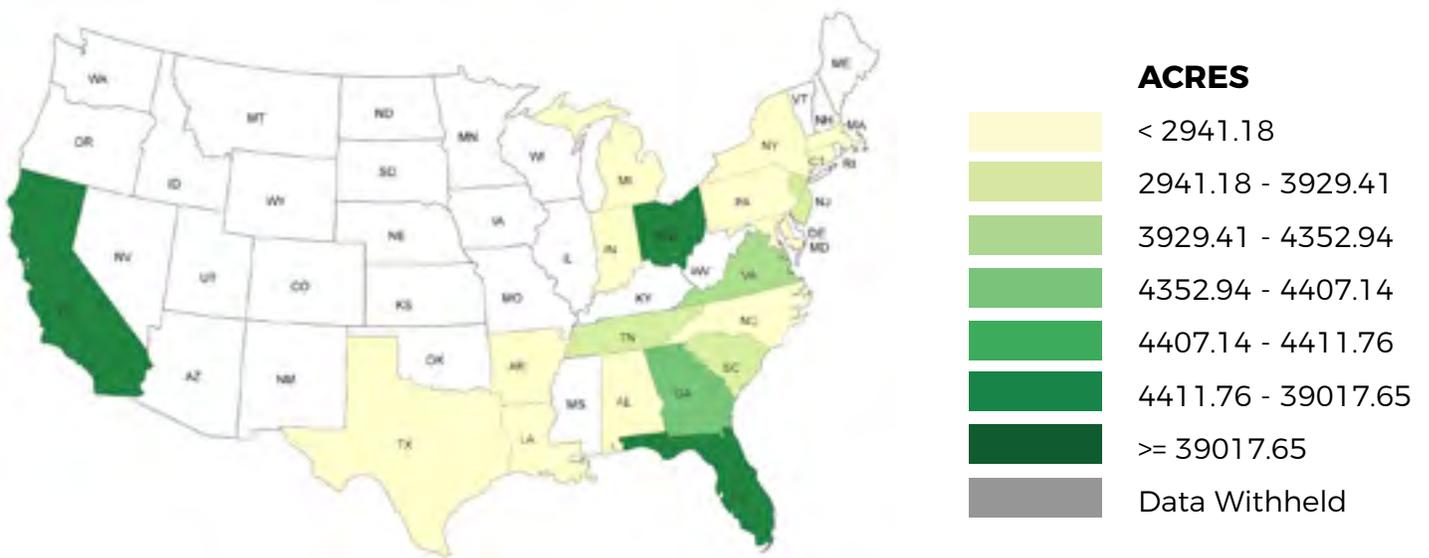
U.S. Fresh Market Tomato Industry

Workers plant, pick, and pack tomatoes throughout the United States. Workers produce hand-harvested fresh market tomatoes for commercial sale in about twenty states, though two-thirds to three-quarters of total production comes from California and Florida. Most of the remainder of production takes place in Ohio, Virginia, Georgia, and Tennessee.²⁸

Tomatoes currently have the highest production valueⁱⁱⁱ of any vegetable produced in the U.S.²⁹ The large economic footprint of the fresh market tomato industry is composed of comparatively few companies^{iv}.³⁰ Increasingly, companies based in one region are expanding their operations to other regions with different growing seasons in order to produce tomatoes for more months of the year.³⁰

The U.S. fresh-market tomato industry is significantly influenced by U.S. trading partners. Since the mid-1990s (the passage of NAFTA), U.S. fresh tomato prices have dropped due to competition from increased imports from Mexico and Canada (hothouse tomatoes).²⁸ Alongside concerns about the adverse impact of international competition, the per-unit value of U.S. agricultural exports increased 85% between 2000 and 2010.^{26,31,32} Since labor comprises 30-40% of agricultural production costs – and an even higher percentage of vegetable production costs – a significant portion of this value gain is likely attributable to labor cost savings.^{30,32}

Acres of Tomatoes Harvested in the U.S. Open, Fresh Market (average 1998-2014)³³



ⁱⁱⁱ In 2014, fresh market tomato production value was \$1.1 billion, and processing tomato production was valued at \$1.3 billion. “Production value” is calculated by multiplying total tomato production by price.

^{iv} Fewer than one thousand firms compose the majority of fresh market production in North America, and fewer than fifty shippers are responsible for moving tomatoes from farms to wholesale, retail, and food-service consumers.

Tomato Production Seasons of Top 6 Tomato-Producing States^{34,35}

FL	CA	VA	GA	OH	TN
Oct - June (no summer or early fall work)	Mar - Oct (Central Valley) Year-round (Southern CA)	Mar - Nov	Mar - Nov	Apr - Oct	Apr - Oct

Work Organization in the U.S. Fresh-Market Tomato Industry

Picking / Pascar

Picking is one of the most common and hazardous jobs in fresh market tomato production.



Stooping

Workers report spending most of their time bent at the waist (agachado) while picking tomatoes^v.

This stooped position allows them to move more quickly than crouching with bent knees or kneeling.

Pickers sometimes crouch or kneel to pick hard-to-reach tomatoes, or when the pain from stooping becomes unbearable.



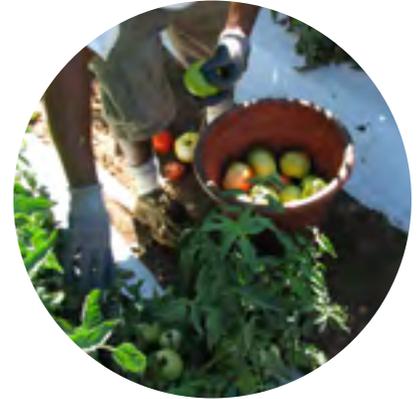
Workers report that picking green tomatoes is easier and faster because they are typically more abundant on the plants. Picking partially ripened (pinto) tomatoes is slower because they have to look more carefully for the right type of tomato. The more time they spend filling a bucket, the more time they spend in a stooped back position without the break offered by standing up and going to the truck.



^vThis has been further confirmed by a biomechanical study of tomato picking, which found that tomato pickers spent over 80% of picking time in stooped back positions.³⁶

Picking

Some pickers choose to wear gloves to protect their hands from pesticide and plant residue and to avoid cutting themselves on tomato twine. Others prefer to pick with bare hands because it allows them more dexterity and lets them feel cooler. Workers report that some farms require pickers to wear gloves (latex or equivalent material) to reduce possible contamination of tomatoes.



Carrying tomatoes to the truck

Workers carry full buckets atop one shoulder. Workers report that many people prefer to carry buckets on one particular shoulder every time, often corresponding to the side of their dominant hand.



Full buckets weigh approximately 30 to 35 lbs, depending on whether workers are expected to fill the bucket to the rim or mound tomatoes above the rim.

If pickers feel pressured to work quickly, which they often do, they may run while carrying the bucket to the truck. The distance they travel from the tomato row to the collection truck varies by the arrangement of the farm and work process of the crew. Distances can be a few yards up to several hundred feet.



Transferring the bucket to the collection truck (lift / toss)

Pickers toss buckets from their shoulders to a worker on the truck called a dumper.

The distance of the throw is about 3 ft, depending on the height of the picker and dumper.

Workers report picking approximately 100 to 200 buckets a day.



Picking Variations

The process described above predominates in the southeastern U.S., which is where the majority of fresh tomatoes are grown. Workers in California described the following variations in their harvest processes.

Handled buckets and bucket swing

Workers in the San Joaquin Valley described harvesting tomatoes into two buckets at a time. These buckets had narrow wire-like handles. Workers estimate they weigh about 25 lbs when full. To transfer tomatoes to the collection truck, workers swing buckets upward by the handles to another worker on the truck.

Boxes and wheelbarrows

Workers in southern California described harvesting tomatoes into tray-like boxes that they stacked onto a wheelbarrow-like cart. Each cart could carry three boxes at a time. It takes an experienced picker about 25 minutes to fill a box. Though carts assist lifting, workers must still stoop to pick tomatoes. After filling boxes, workers push carts to a large collection bin stationed at the edge of the field.



Dumping / Dompear

Catching and dumping the bucket

Dumpers catch full ~30lb buckets and empty them into large bins. This involves musculoskeletal hazards of arm extension, sudden loading of muscles, and combined lifting and twisting.

Dumpers' work pace is partly determined by the number of pickers and their pace. With more pickers, dumpers' work is more constant and rapid.

Usually there are two dumpers per collection truck – one on each side.

Dumpers may feel they cannot take a break since delays slow the entire crew.

Returning the bucket

Dumpers toss empty buckets back to pickers. In some places, the dumpers are responsible for putting a ticket or token in the empty bucket. Tickets are later tallied to calculate the number of buckets picked and wages earned.

Moving tomato bins

Dumpers fill bins on the bottom layer first. They move empty bins on the top layer as needed to cover or uncover bottom layer bins. Workers estimate that an empty bin weighs about 70 lbs.



Pesticide, fungicide, herbicide application / “Esprayar”

Pesticide applications vary by pest, farm, region, and climate. Commercial tomato production uses more pesticides than many other field crops due to the wide variety of pests affecting tomatoes.¹²

At the height of the season, pesticide handlers may apply treatments to tomato plants several times a week.¹¹ Workers may use tractors with boom sprayers (most common), backpack sprayers, or planes to apply chemicals. Pesticide handlers are required to complete training in how to properly apply pesticides. Pesticide workers should use personal protective equipment (PPE) such as head and eye coverings, respirators, chemical resistant coveralls, gloves, and boots. Workers wearing non-breathable protective equipment are at risk for increased heat strain. Some farms invest in “closed system” technology that eliminates the need for workers to mix chemicals by hand.

Placing plastic mulch, irrigation, fumigation / Poner plástico, manguera, gas

Workers prepare fields for tomato production by forming beds, placing irrigation pipes and plastic mulch, and often fumigating the soil with chemical mixes that kill weeds, nematodes, and fungus. All fumigant chemicals are considered restricted-use pesticides.³⁷ One of the most common fumigant mixes used on tomato beds is chloropicrin with 1,3-dichloropropene, which has known associations with cancer and can cause a variety of acute health problems.^{13,38} See Appendix II for more details.



Driving the tractor

One worker drives a tractor that shapes dirt into rows. Either the same tractor or another tractor unrolls plastic sheeting, which may include irrigation drip tape. Workers may apply fumigants to the soil through an injection system or through the drip irrigation. These systems may be part of the plastic-laying process or separate processes.

Anchoring and cutting the plastic

Workers may complete the tractor-aided plastic laying by walking behind the tractor and shoveling dirt onto the sides of the plastic mulch. This is meant to ensure that the plastic is securely anchored. Workers report that during this process it is possible to be exposed to fumigant gas escaping from openings in the plastic mulch. They report that gas exposure can cause dizziness, nausea, and watering, burning eyes.

Planting / Planter

Planting from back of tractor

Workers drive a specially equipped tractor that punches holes in the plastic mulch.

Some tractors have seats affixed just above ground level on the back of the tractor. Workers in these seats drop tomato plants into the newly created holes in the mulch.

Other workers may follow the tractor on foot to ensure plants are placed correctly and covered.



Planting without a tractor

If fields are inaccessible to tractors or machinery is unavailable, workers plant rows by hand. They may punch holes in the plastic with a spear-like tool or by pushing a cart with a spiked wheel over the top of the bed.

Once holes are punched, workers stoop or crouch to place the tomato plants by hand. They typically do not use any tools to place plants. In this job, workers are in close contact with chemically treated soil and plastic mulch.

Staking / Estacar

Hammering stakes by hand

Workers drive stakes into the ground using heavy tools. Stakes can be 5 to 7 feet tall. This means that workers must lift stakedriving tools well above shoulder height – and sometimes above their heads – to hit the top of the stake. Shorter workers may be at increased risk of muscle injury or sustaining a blow to their heads. Usually people work alone, but they may work in teams in which one person carries and places the stakes in their proper row locations, while another person follows to hammer them into the ground.

Workers report the following injuries associated with staking:

- Rebound blows to head, torso, or arms if worker loses control of the staking tool
- Overuse injuries due to elevated arm postures, loading of muscles, repetitive motion
- Lacerations from sharp broken stakes
- Blisters on fingers and palms
- Splinters on hands or forearms

The most commonly used tools are capped metal tubes of varying lengths and weights. Some tubes may have handles



(these handled tools are known to some workers as “niños”). Workers may also use hammer-like metal blocks to drive stakes. In many cases, these tools are partially “homemade” – tubes or metal blocks have been adapted by welding on metal handles or extending existing handles with PVC piping.

Staking with a machine

Larger farms have machines that workers operate to place stakes. This requires less labor and removes several sources of potential staking injuries.

Unstaked tomatoes

Some varieties of tomato plant do not require the support of stakes or twine to grow (see below).



Pruning / Destallar o Desbrotar:

Taking off tomato plant shoots:

Workers pinch shoots off young tomato plants, usually one time before placing stakes. They commonly prune with their hands rather than with a tool. This task requires extended stooping over small plants.

Placing Twine / Amarrar

Wrapping and cutting twine

Workers weave twine (hilo) between the stakes after they are set. They carry the twine in a small cardboard box that they wear on a belt around their waist. They thread the twine from the box through a small tube or pipe that keeps the twine from getting tangled and helps workers to pull the twine quickly from the box to wrap it around stakes.

It is common for workers to rip twine with their hands rather than cut it with a tool. When they reach the end of a row of stakes, they may wrap the twine around the last stake or around their hand several times and then quickly jerk the twine to snap it.

Workers report that placing the first row of twine (the level closest to the ground) is the most strenuous since it requires the most stooping. As plants grow, workers add additional levels of twine.

If workers make sure the first row is sufficiently tightly strung, the subsequent rows of twine are reportedly easier to place, because the plants are better supported at lower levels. They usually complete 4-6 rounds of tying per season.

Plastic sheet mulch removal / Jalar plástico

Pulling up plastic

Workers describe pulling up plastic as a very dirty job. They bend to pull up plastic and carry it to piles that tractors later pick up for disposal. Some people may wind the plastic around a stake as they pull it up to carry it. Depending on how much plastic is gathered, a bundle can weigh up to 100lbs. Some farms have tractors to help pull up plastic.

Packinghouse / La Empacadora, La Bodega

There are a variety of jobs in packinghouses, including:

- Tomato sorting
- Tomato packing
- Box making and stacking
- Forklift operation

Most packinghouse workers are either sorters or packers.

Work processes vary depending on the setup of the particular packinghouse. Some packinghouses are owned by the tomato company, so they just pack tomatoes. Other packinghouses may also pack other fruits and vegetables.

Since each worker is assigned to a particular role in the assembly line, it can be difficult to take breaks. Supervisors set the speed of the machines, which set the pace of work. Often work begins in the morning and continues late into the night (as late as 11 p.m. - 1 a.m.), depending on customer orders and the amount of tomatoes arriving at the packinghouse that day.



Photo: ETSU Rural Track Class



Photo: ETSU Rural Track Class

Workers report that work in the packinghouse is not as physically strenuous as work in the fields. Nevertheless, they report experiencing the following physical effects of their work:

- Lower back, knee, and foot pain from standing in one place most of the day
- Feeling dizzy or faint from standing continuously and from watching the moving belt
- Neck and upper back stiffness and pain from bending over the belt
- Wrist pain
- Numbness and tingling in hands and feet
- Itchy hands from tomato residues
- Blisters on feet

The general process for tomato sorting and packing includes the following steps:

1. A forklift driver moves the bins of tomatoes from collection trucks into the packinghouse.
2. Tomatoes are dumped into a cleaning tank, then travel on a roller ramp to a conveyer belt.
3. Sorters are responsible for picking out different kinds of tomatoes: “trash” or rotten tomatoes, red, orange, pinto, green. Each person is assigned to sorting one particular type. They move that type from the belt to a bin or another belt.
4. Packers put the sorted tomatoes into boxes. A typical box weighs about 25 lbs.
5. Workers move the full boxes to storage or into shipping trucks.



Photo: ETSU Rural Track Class



Variation - Field packing

When people pack tomatoes in the fields, they usually use vehicles that resemble moving trucks, and they do not usually use large plastic bins.

Instead, they dump the tomatoes from the pickers' bucket into a box or tray in the truck. This allows them to sort tomatoes by color, condition, and size and pack the tomatoes directly into boxes that will be sent to customers.

Field-packed tomatoes are usually at more advanced stages of ripeness. Workers call these tomatoes pinto, estrella, naranja, or rojo (painted, star, orange, or red).

Management

Labor Contractor / Contratista

Labor contractors work with farm owners or tomato production companies to hire the workers they need to complete the work of tomato production. U.S. law requires farm labor contractors to register with the Department of Labor and adhere to a number of basic employment and safety standards. For more information, refer to Appendix III.

Contractors' responsibilities may include:

- Communicating and arranging terms of work and payment with tomato farm companies
- Working with farm company management to get workers their paychecks
- Appointing supervisors / mayordomos to oversee work in fields or packing houses
- Overseeing workers in fields or packing houses (similar to the role of supervisor / mayordomo - see below)
- Working with mayordomos / supervisors and nicleros to ensure enough workers have been hired and are available to work
- Making arrangements to provide necessary tools and supplies to the fields



Mayordomo, Supervisor

Mayordomos' or supervisors' role is managing crews of workers either in the fields or in the packing houses. Mayordomos may work under the direction of a supervisor, or, in some places, the terms mayordomo and supervisor may be used interchangeably. Mayordomos and supervisors often work under the direction of the labor contractor.

Their responsibilities may include:

- Working with other managers to determine what tasks need to be completed
- Setting expectations about work pace, breaks, safety, and workplace behavior
- Recording number of hours worked or number of buckets picked
- Overseeing how workers are doing their jobs

Niclero

Nicleros are responsible for arranging housing and transportation for crews of migrant workers. They typically coordinate logistics for about thirty-five workers. Multiple nicleros may work for the same labor contractor.

Their responsibilities may include:

- Collecting rent and/or transportation payments from workers
- Finding housing at work destinations
- Paying landlords and working with them to make sure electricity and water are on
- Paying drivers, making sure crew members have transportation to work

Agricultural Employment “Human Resources” Information

Work Hours and Payment Systems

- Most – but not all – U.S. agricultural workers are covered by minimum wage requirements^{39,vi},
- Agricultural workers are excluded from federal overtime pay requirements (29 USC § 201)

^{vi} No agricultural employers are required to pay the minimum wage to “hand-harvest laborers paid on a piece-rate basis” who were not employed in agriculture longer than 13 weeks in the previous year. Additionally, smaller employers that did not hire more than 500 “man-days” of labor during any calendar quarter are exempt. To accumulate over 500 man-days, an employer would have to hire between 5 and 6 workers every day of the week in a quarter. In 2012, only 19% of all U.S. farms hired more than 5 workers. This means that 859,030 workers employed by smaller farms – or 31% of workers reported in the agricultural census – were not legally entitled to the federal minimum wage.

- Wages may be hourly or “piece-rate,” e.g., workers earn money for each piece of work completed, depending on the task and the company.
- Typically crew supervisors and/or contractors are responsible for maintaining records of hours worked or pieces of work completed. Some companies have introduced time registration devices (punch cards or swipes) to ensure more accurate record keeping. Such supervisors may also be responsible for distributing paychecks at the end of each week.

Tomato Field Work

- Putting down and pulling up plastic, staking, twining, and pruning may be paid by the row, by the field, or hourly. Dumping may be paid by the day or by the hour.
- Picking is almost always paid by the number of buckets picked.^{vii} However, some companies offer hourly-wage picking. Picking typically starts after the morning dew has evaporated from the fields.
 - ◇ Workers report that piece-rate picking is typically faster paced than hourly work.
 - ◇ Some workers mentioned that piece-rate work allows more flexibility in pacing, since they can stop for short breaks as they wish. They contrasted this to hourly work, which they said is more closely supervised by crew leaders who make sure that people maintain a certain pace.
 - ◇ Experienced workers report they can earn more per day if they work for a piece-rate wage than an hourly wage.

Packinghouse Work

- Packinghouse work is typically paid by the hour.
- Depending on the amount of tomatoes ready to be packed and the size of the farm, work may start in the morning or afternoon. Packinghouse work may continue late into the night (as late as 11 p.m.-1 a.m.) in order to get orders ready or to finish packing all the tomatoes harvested that day. Some packinghouses hire multiple shifts of workers.
- At some companies, workers may pick tomatoes in the morning or afternoon and work in the packing house in the later afternoon or evening.
- **Breaks**
 - ◇ Break schedules vary considerably. At some workplaces, workers may have a half-hour lunch break and the option to take ten-minute rest breaks. At some workplaces, supervisors may abbreviate or deny breaks. Breaks are seldom – if ever – mandatory.

^{vii} As of 2016, many companies are paying around \$0.60-\$0.80 per bucket of green tomatoes. In some situations, companies may pay more per bucket when it takes longer to fill- e.g. cherry and grape tomatoes are paid at a higher rate per bucket than green tomatoes.

Health and Safety Protections

- Agricultural workers are not protected by the same health and safety regulations as many other workers in the U.S., despite the fact that agriculture has among the highest occupational morbidity and mortality rates of all U.S. industries.¹⁹
- Federal and state laws have established certain standards meant to mitigate the effects of pesticide exposure and to ensure adequate hydration and hygiene in the fields. For more information, refer to Appendix III.

Hiring Practices

- Hiring practices vary considerably, depending on prospective workers' location, experience, social connections, and immigration status, among other factors.
- Generally, tomato production companies work with labor contractors to hire seasonal workers for the growing and harvesting season. Contracting practices vary depending on the size of the company and whether they grow other crops in addition to tomatoes.
- Contractors may hire groups of workers from the same family or who are from the same town.
- Once hired, workers may stay with the same contractor and work crew as they move from harvest to harvest, or they may find work elsewhere after a particular harvest is done. If workers do not have their own transportation or immigration documentation, their options may be limited. Workers who have accumulated years of experience in the industry may have established connections with particular employers for whom they work year after year.
- Workers report that being fired unjustly and threats of being fired are quite common.



U.S. Farmworker Demographics

Countries of Origin⁴⁰



* People of Haitian origin may be more represented among tomato workers than among US farmworkers overall. There's also significant representation from indigenous Latin American communities. Note that Spanish may NOT be these individuals' native language.

Immigration Status^{40,41}

U.S. Citizens & Permanent Residents ("Green Card")	H-2A Temporary Agricultural Workers	Unauthorized workers
<p>~33% of U.S. farm workers are U.S. citizens.</p> <p>~18% of U.S. farm workers are lawful permanent residents.</p>	<p>~ 1% of U.S. farm workers have 'work authorization' through statuses like H-2A</p> <ul style="list-style-type: none"> Employers request H-2A permits from US Citizenship and Immigration Service US Dept of Labor is supposed to enforce certain wage, housing, and transportation standards H-2A is usually given to tomato workers for 6 mo. When H-2A status expires, workers must return to their countries of origin 	<p>~ 48% of U.S. farm workers are unauthorized.</p> <ul style="list-style-type: none"> Unauthorized workers may have family members who are U.S. citizens and/or permanent residents. People who came to the US as children without documents may qualify for a temporary employment authorization under "DACA" (Deferred Action for Childhood Arrivals)

Estimated percentages on this page are from the 2007-09 U.S. National Agricultural Workers Survey.

Supporting Occupational Health Interventions

A number of interventions can help protect and promote tomato workers' occupational health. Clinicians can support these interventions in roles as health care providers, advisors, and community leaders.

Tips for Clinicians

- **Take thorough occupational health histories.**^{viii}
 - ◇ Ask specific questions about occupational exposures and associated symptoms. Patients may assume that certain exposures or symptoms are “normal,” thus they may not report them unless specifically asked.
 - ◇ Occupational health history questions: “WHACS”
 - » What do you do at work?
 - » How do you do it?
 - » Are you concerned about being exposed to anything dangerous at work or outside of work?
 - » Coworkers with similar symptoms?
 - » Satisfied with your job?
- **Educate patients about occupational hazards**
 - ◇ Support educational programs led by community health workers or promotores who share life experiences or family backgrounds similar to farmworker patients.
 - ◇ Consider workers' occupational, economic, and social circumstances when delivering health education interventions.
 - » Materials and recommendations may need to be adapted to be relevant to a farmworker audience.
 - » Keep in mind that workers frequently have limited control over their schedules, work pace, assigned job tasks, and protective equipment.
- **Make health care services accessible to workers**
 - ◇ **Hours:** Workers may have more free time during evenings and weekends.

^{viii} For more information, refer to “Diagnostic Tools” on the Farmworker Clinical Care Resource for Occupational Health webpage (<http://farmworkercliniciansmanual.com/index.php/common-health-conditions/>) or “Recognizing Occupational Disease – Taking an Effective Occupational History” from the American Academy of Family Physicians (<http://www.aafp.org/afp/1998/0915/p935.html>)

- ◇ **Location:** Provide transportation to clinic, or arrange “field clinics” to deliver health care services at community locations within walking distance of workers’ employment or housing.
- ◇ **Expense:** Provide free services and reduce expenses whenever possible.
- **Partner** with tomato workers, agricultural employers, agricultural extension offices, local social service providers, and/or universities to help design and implement occupational health interventions.^{ix}
 - ◇ Encourage partners to prioritize interventions that aim to change environments by eliminating, replacing, or isolating hazardous exposures. These interventions protect workers more effectively than approaches that rely on individual workers to change workplace norms or personal behaviors. The occupational health “Hierarchy of Controls” model below illustrates this spectrum of intervention effectiveness.
- **Advocate** for public policies that foster healthy working environments and access to quality, affordable health care.
 - ◇ Clinicians’ unique understanding of patients’ health and illness can provide helpful and nonpartisan insight into current or proposed public policies at local, state, and federal levels.



www.cdc.gov/niosh/topics/hierarchy/

^{ix} Refer to references 14, 42, 46 for examples of agricultural occupational health interventions and community partnership models.

Tips for Occupational and Environmental Health Practitioners

Research findings support the following recommendations for protecting and promoting tomato workers' health through interventions targeting organizational systems:

- **Mandatory rest breaks**

- ◇ Rest breaks are the only known, readily applicable remedy for musculoskeletal injury caused by stooping, and they are also critical in preventing heat illness.^{4,49} However, current systems pressure workers to forgo such protective breaks. Therefore, field supervisors should make frequent brief rest breaks mandatory for workers. Farm owners and managers should support supervisors in implementing this practice, and industry and/or government officials can support farm management in turn by taking steps to make mandatory rest breaks an industry standard.

- **Incentives and recognition for safe supervisory practices**

- ◇ There are many employers and supervisors who want to treat their workers well. Incentives to promote workers' health should be bolstered, thus making it easier for supervisors to choose behaviors that protect workers. Such incentives could take the form of income bonuses for supervisors whose crews complete the season without experiencing major injuries or illnesses or whose crews consistently achieve full compliance with safety measures. Successful implementation of such incentive programs would require accurate monitoring and reporting of occupational health harms and safety practices.

- **Continued implementation and expansion of workplace accountability measures**

- ◇ The Fair Food Program developed by the Fair Food Standards Council and the Coalition of Immokalee Workers contains several accountability measures, including a 24-hour worker complaint hotline, investigation and complaint-resolution processes, timekeeping systems to track the number of hours individuals have worked, and workers' rights education programs.⁵⁰ Positive publicity, customer loyalty, ethical business practice, and the health of employees can all be considered incentives for companies to participate in the Fair Food Program.

- **Proactive enforcement of existing health and safety laws**

- ◇ This can be a means to ensure agricultural employers comply with their legal responsibility to provide certain occupational health protections to employees. It is possible for state governments to implement regulations to protect workers beyond existing federal requirements.

- **System-wide interventions**

- ◇ Industry leaders and agricultural scientists should pursue business and crop-management models that facilitate more stable employment and reduce reliance on toxic agricultural chemicals and ergonomically hazardous manual harvesting methods.
- ◇ Citizens and political leaders should work toward creating a fair and legal pathway to work authorization and residency status for agricultural workers.

These systemic and long-term interventions could remedy urgent and major sources of vulnerability at the root of much of tomato workers' suffering and poor health.



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Photo Credits

Unless otherwise specified, all photos courtesy of Rural Medical Services, Inc., Newport, TN, or Nicole Manz (BA ETSU 2013).



Appendices

I - Spanish-English Glossary of Tomato Production Terms

Job Positions	Puestos
Boss	Patron
Card puncher	Ponchadora
Contractor	Contratista
Crew leader	Mayordomo
Owner	Dueño
Packing	Empacar
Picking	Piscar, Cortar
Planting	Plantar
Pruning	Destallar, Desbrotar
Pulling up plastic mulch	Jalar plástico, Sacar plástico
Putting down plastic mulch	Poner plástico
Sorting	Sortear, Separar
Spraying	Esprayar
Staking	Estacar
Twining	Amarrar

Tools and Equipment	Herramientos y Equipo
Bin	Ben
Long sleeved shirt	Camisa de manga larga
Bucket	Cubeta , Balde
Stake	Estaca
Brace	Faja
Cap	Gorra
Gloves	Guantes
Twine	Hilo
Conveyor belt	La banda
Assembly line	La linea
Irrigation hose	Manguera
Hammer	Martillo
Opening in row/bed	Puerta
Row / bed	Surco, Bloque
Tractor	Tractor
Truck	Troque
Tube	Tubo

Appendices

I - Spanish-English Glossary of Tomato Production Terms

Job Positions	Puestos
Crew	Cuadrilla
Person in charge of housing and transportation logistics	Niclero
Person who picks/pack "pinto" tomatoes	Pintero
Supervisor	Supervisor

Tomato Plant Descriptors	Descripciones de las plantas de tomate
Branch	Rama
Leaf	Hoja
Stem	Tallo
Tomato	Tomate
Tomato plant	La mata

Tools and Equipment	Herramientos y Equipo
Handled stake-driver	"El Niño"
Mask	Máscara
Trailer	Traila
Tray (e.g. of tomato seedlings)	Charola

Types of Tomato	Tipos de Tomate
Cherry	Cherry
Grape	Uva
Green	Verde
High-quality / "clean"	Limpio
Orange	Anaranjado
Paint / Painted	Pinto
Red	Rojo
Ripe	Maduro
Star	Estrella

Occupational Injury	Herida Laboral
Become numb	Entumarse
Blisters	Ampollas
Cramp	Calambre
Endure	Aguantar
Getting hit with a bucket	Cubetada / Cubetar
Itching	Comezón
Jam / twist fingers	Enchuecarse los dedos
Massage sore joints/ muscles (literally, "knead")	Sobar
Person who massages sore joints	Sobador
Splinters	Astillas
Stand up	Enderezar
Stoop	Agachar
Swell / Swollen	Hinchar / Hinchado

Occupational Injury	Herida Laboral
Bend	Doblar
Burn (e.g. eyes)	Arder
Burn (e.g. skin)	Quemar
Dizziness	Mareo
Faint	Desmayar
First aid kit	Botiquín de primeros auxilios
Get hives	Salirse ronchas
Getting hit in the head and disoriented	Descalabrarse
Lower back	Cintura
Rash	Sarpullido
Slip (e.g. on mud)	Resbalarse
Syrup / Pedialyte	Suero
Twist your ankle	Torcerse el tobillo
Vomit	Vomitar

II - Common Pesticide Types Used on Tomatoes & Effects on the Body ^{13,42}

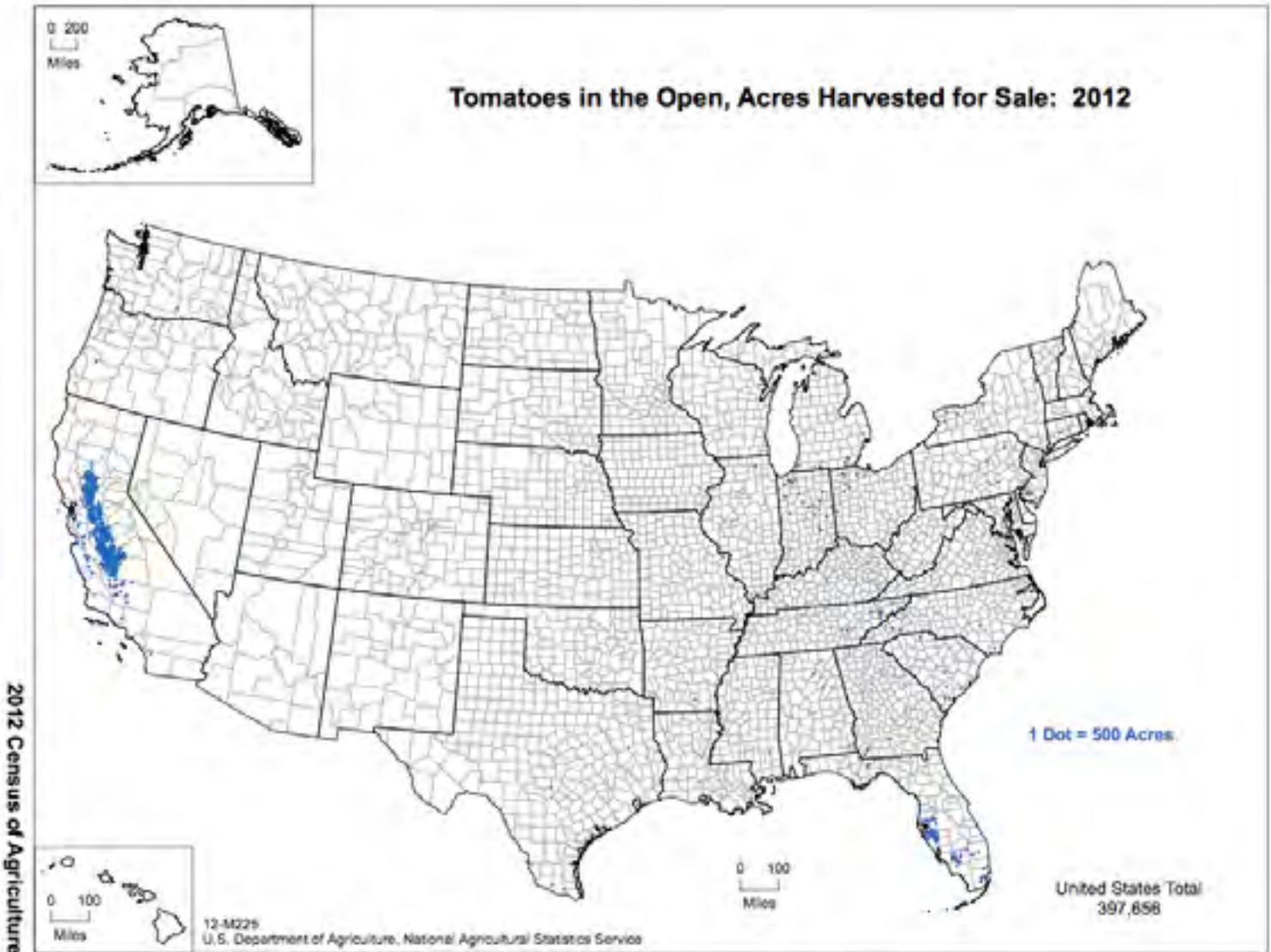
Pesticide Class	Pesticide Class	Notable Potential Symptoms
<p>Neonicotinoids (relatively new class of pesticides)</p>	<p>Stimulates or blocks aspects of the nervous system due to excessive stimulation of nicotinic receptors.</p> <p>Certain formulations can damage the central nervous system and cause cancer.</p>	<ul style="list-style-type: none"> • Early stage: salivation, sweating, dizziness, nausea, vomiting, diarrhea, burning feeling in mouth or throat, agitation, confusion, headache, abdominal pain • Severe exposures: irregular heart rhythms, difficulty breathing, seizures, shock, loss of consciousness
<p>Organophosphates (wide variety of names)</p> <p>N-Methyl Carbamates have a similar effect. (often “-carb-” is part of chemical name)</p>	<p>Inhibits cholinesterase, resulting in a buildup of acetylcholine. This causes overstimulation of the multiple aspects of the nervous system.</p>	<ul style="list-style-type: none"> • Early stage: Increased secretions (sweat, saliva, tears, runny nose), headache, nausea, dizziness, small pupils (miosis), anxiety and restlessness • Later stage: Muscle twitching and/or weakness, tremor, incoordination, abdominal cramps, vomiting, diarrhea, decreased respiratory rate, seizures, loss of consciousness
<p>Organochlorines (Endosulfan & Dicofof)</p>	<p>Damages nerve and heart tissue. Interferes with endocrine system function. Can remain in fat tissue over long periods of time.</p>	<ul style="list-style-type: none"> • Early stage: Tingling or numbness of face or extremities, tremor, incoordination, headache, dizziness, nausea, vomiting, confusion • Severe exposures: Seizures, respiratory depression, coma

Pesticide Class	Pesticide Class	Notable Potential Symptoms
<p>Pyrethroids (often “-thrin-” is part of chemical name)</p>	<p>Stimulates release of catecholamines, resulting in hyperexcitability of the sympathetic nervous system.</p>	<ul style="list-style-type: none"> • Stinging, burning, itching, tingling and/or numb sensation of exposed skin (“parathesias”); fine tremors; irritability to sound and touch • Severe exposures: excessive salivation, choreoathetosis (e.g. compulsive “dance-like” / squirming movement), muscle fasciculations, pulmonary edema, seizures, coma
<p>Halocarbon fumigants (chloropicrin + 1,2-dichloropropane mixes commonly used in tomatoes)</p>	<p>Highly diffusible and easily absorbed across pulmonary tissue, GI tract, and skin. Some can penetrate rubber and neoprene protective gear. Halocarbons are associated with carcinogenicity and central nervous system, liver, renal, & reproductive toxicities.</p>	<ul style="list-style-type: none"> • Chloropicrin: Severe upper respiratory, eye, and skin irritant. Inhalation can lead to vomiting; ingestion to corrosive gastroenteritis. Strong odor “warning agent” • 1,2-dichloropropane: Severe upper respiratory, eye, and skin irritant. Liver, kidney, cardiac toxicity seen in animals; limited human data available.
<p>Others</p>	<p>Note that this is not meant to be an exhaustive list. Many other kinds of pesticide agents may be used in different regions of the tomato industry.</p>	

This information and more can be found in: Roberts, J., & Reigart, J. R. (2013). Recognition and management of pesticide poisonings. (6th ed.). Washington DC: Office of Pesticide Programs, U.S. Environmental Protection Agency. Retrieved from www2.epa.gov/pesticide-worker-safety

* Note that in many cases, the manufacturer’s label is the main source of safety information for agricultural chemicals due to the lack of third-party studies of short- and long-term human health impacts of many pesticides.

Refer to Appendix III for pesticide safety regulations.



III - Agricultural Workplace and Worker Safety Requirements ³¹

Note that federal government agencies may delegate enforcement of federal labor laws and health and safety standards (when they apply) to state agencies. Different states may devote different levels of resources and attention to enforcement.

Federal Policy

Occupational Health and Safety Act

Federal OSHA only regulates certain aspects of U.S. agriculture (29 USC § 654).

- In 2012, for example, legal exemptions excluded 46% of agricultural workers from OSHA protections.^{43, x}
- Agricultural workplaces that are subject to regulation remain exempt from a number of standards, including regulations of hazardous materials, working and walking surfaces, and personal protective equipment (29 CFR 1910).^{xi}

Twenty-two states have a federal OSHA-approved “State Plan” that permits the state government to operate its own occupational health and safety program. Under these plans, some states have implemented agricultural worker protections in addition to federal regulations.

OSHA Field Sanitation Standard

This standard requires employers to provide field workers with potable drinking water, hand washing facilities, and toilets, and to maintain each of these in clean condition in accordance with public health standards (29 CFR 1928).

- Drinking water must be: placed in locations that are “readily accessible” to all employees; “suitably cool and in sufficient amount” considering “air temperature, humidity and nature of the work” and dispensed with single use cups or fountains
- There should be 1 toilet and hand washing facility per 20 workers
- Toilet and hand washing facilities should be within a quarter mile of each employee’s workplace.

^x These legal exemptions come in the form of riders that Congress attaches to annual appropriations bills. They specifically prevent OSHA from regulating smaller agricultural employers who hire fewer than ten or fewer people.²⁶ California, Washington, and Oregon have more comprehensive state plans enforce OSHA standards on all farms.¹²

^{xi} Applicable components of Standard 1910 are those pertaining to temporary labor camps, storage and handling of anhydrous ammonia, logging operations, slow-moving vehicles, hazard communication, cadmium, and retention of DOT placards and labels. Other subparts of the standard do NOT apply.

- Toilets should be private and be “adequately ventilated, appropriately screened, and have self-closing doors that can be latched from the inside”
- It also requires employers to inform employees of the following:
 - ◇ Drink water frequently and especially on hot days;
 - ◇ Urinate as frequently as necessary;
 - ◇ Wash hands both before and after using the toilet, and before eating and smoking.

Migrant and Seasonal Agricultural Worker Protection Act (AWPA)

AWPA is the main federal law that deals with agricultural employment. It requires agricultural employers to follow basic vehicle safety, housing safety, wage, recordkeeping, and disclosure standards (29 CFR 1928).^{xii} This law assigns the responsibilities of an employer to both labor contractors and to farm owners and operators, which is known as a “joint employer” approach.

- Farm labor contractors must register with the Department of Labor or with an authorized state agency. If they are providing housing or transportation, they need to provide proof that the housing and/or transportation meet state and federal health and safety standards.
- Employers and contractors need to provide workers with written information in the workers’ language about:
 - ◇ Place, period and kinds of activities involved with employment
 - ◇ Wages
 - ◇ Transportation, housing, any other employee benefits, and any costs charged to workers
 - ◇ Information about state workers’ compensation (if applicable)
 - ◇ Existence of any strike or interruption of operations by employees at the place of employment
 - ◇ Whether the contractor/employer receives a benefit for items that may be sold to workers while employed
- Employers and contractors need to create and keep payroll records for three years.^{xiii} They also need to provide each employee with a written statement of earnings, deductions (plus reasons for deductions), and net pay. Employees should be paid every two weeks.

State-specific Heat Illness Prevention Regulations:

California (8 CCR § 3395)

The California Heat Illness Prevention Standard applies to all outdoor places of employment.

^{xii} Employers that are exempt from minimum wage requirements (see footnote on previous page) are also exempt from AWPA requirements.

^{xiii} These records should include: information on wages, hours worked, number of piecework units earned, total earnings, sums withheld and their purpose, and net pay.

It requires employers to implement the following measures:

- **Shade:** When the temperature is 80°F or above, shade must be present and easy for employees to access.^{xiv}
- **Emergency response:** Employers must implement emergency response measures, including maintaining effective communication with employees in case of emergency, providing appropriate first aid, and contacting emergency medical services.
- **Acclimatization:** A supervisor should closely observe employees newly assigned to a high heat area and all employees during heat wave conditions.
- **Training:** Supervisors and employees should receive training on heat illness prevention, common symptoms, and first aid measures, as well as employer's procedures for preventing and responding to heat illness.

Additionally, agricultural employers must implement the following "high heat procedures" when the temperature is 95°F or above:

- Ensure that each employee takes at least ten minutes of preventative cool-down rest every two hours and can contact a supervisor when necessary to prevent or treat heat illness.
- Observe employees for alertness and signs or symptoms of heat illness, and designate at least one employee to call for emergency medical services when necessary.
- Remind employees to drink water, and convene pre-shift meetings to remind employees of high heat procedures and heat illness prevention measures.

Washington (WAC 296-62-095)

The Washington Outdoor Heat Exposure Standard applies to all outdoor work environments from May through September when the temperature is above designated levels. It requires employers to do the following:

- Provide sufficient and readily accessible drinking water to employees at all times.
- Allow employees exhibiting signs of heat-related illness to take breaks to cool off and monitor them to determine whether they need medical attention.
- Train employees and supervisors in how to prevent heat-related illness, common signs and symptoms of heat-related illness, and how to respond to heat-related illness, including how to reach emergency medical services.

^{xiv} If there are no existing sources of shade at the worksite, the employer must erect a shade structure. There needs to be enough shade to allow the number of employees on rest or meal periods to be fully in the shade.

Pesticide Safety Regulations⁴⁴

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA directs the Environmental Protection Agency (EPA) to regulate pesticides that are sold and distributed in the U.S. by registering them (7 USC 136).

- To be registered, the company seeking to sell the pesticide must show that the pesticide does NOT cause:
 - ◇ Any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide
 - ◇ A human dietary risk from residues that result from a use of a pesticide in or on any food (Schierow & Esworthy, 2012).^{xv}
- The EPA may register a pesticide for general or restricted use. Since restricted use pesticides are more dangerous, people who apply restricted-use pesticide must be trained and certified.
- The pesticide manufacturer is required to label registered pesticide products with approved uses, application instructions, and restrictions.
- The EPA is required to re-evaluate pesticide registrations every 15 years.

* Note that registration with the EPA does not mean that pesticide products are low-risk. The EPA is only required to evaluate pesticides based on net costs and benefits to society as a whole, which includes considering not only health impacts but also economic and social impacts. According to the EPA rules under FIFRA, therefore, “a product may pose risks to workers, but risk may nevertheless be reasonable in comparison to the economic benefit of continued use of the product to society at large.”⁴⁵

EPA Agricultural Worker Protection Standard (WPS)

The WPS is meant to reduce agricultural workers' risk of illness or injury due to pesticide exposures. It contains regulations about:

- **Pesticide safety training**
 - ◇ Employers should provide training to workers every year. The WPS outlines specific content that should be included in the training, such as how to mitigate exposures and what to do in case of emergency.

^{xv} As part of this process, the applicant to the EPA submits data on toxicity, analytic methods, and a determination of how much of the pesticide would remain on crops and/or food products assuming the pesticide was applied according to manufacturer specifications

- **Access to information about pesticides**
 - ◇ Employers should:
 - » Post pesticide information around certain pesticide treated areas^{xvi} and in a central location that is accessible to all workers.
 - » Provide product and application information to medical personnel when a worker seeks medical assistance due to pesticide exposure.

- **Protections during and after pesticide applications**
 - ◇ Employers should:
 - » Prohibit employees from entering areas within 100 feet of pesticide application equipment when pesticides are being applied.
 - » Prohibit children under age 18 from handling pesticides.
 - » Enforce “restricted entry intervals” (REIs) found on pesticide labeling that designate the amount of time that must pass before workers can enter a treated area without wearing personal protective equipment.
 - ◇ Employees should:
 - » Abide by posted safety requirements and restricted entry intervals.

- **Personal protective equipment**
 - ◇ Employers should provide appropriate personal protective equipment^{xvii} to pesticide handlers and employees who must enter treated areas during restricted entry intervals.

- **Decontamination supplies**
 - ◇ Employers should ensure that sufficient^{xviii} water, soap, and towels are available for workers to wash their hands regularly and to wash their body in case of exposure. They should also ensure access to an eye flush system if the pesticide label requires eye protection.

- **Emergency medical assistance**
 - ◇ Employers should ensure prompt transportation to medical assistance if a worker becomes ill due to pesticide exposure. They should also provide information about the product and circumstances of exposure to medical personnel.

The WPS was updated in 2015; new regulations will be phased in by 2018.

^{xvi} Areas that have been treated with pesticides that have a restricted entry interval of longer than 48 hours.

^{xvii} If the pesticide label calls for respirators, employers should follow standards regarding medical evaluation, fit testing, and training.

^{xviii} Minimum amounts of water are 1 gallon for each worker and 3 gallons for each pesticide handler or worker who enters a treated area before the end of the restricted entry interval

Resources about WPS from Migrant Clinicians' Network:

- Preventing Agricultural Pesticide Exposure: Revisions to the EPA's Worker Protection Standard - http://www.migrantclinician.org/files/WPS_MCN_FJ_IssuesBrief2016.pdf
- Worker Protection Standard - <http://www.migrantclinician.org/files/WPS-2015.pdf>

State-level pesticide regulations

- 30 states require clinicians to report suspected and confirmed pesticide poisonings
- 12 states have surveillance systems to facilitate response to pesticide exposure incidents
- 2 states (CA and WA) require blood test monitoring of pesticide handlers' exposure to organophosphate and carbamate

Enforcement of pesticide regulations

The EPA has the overall authority to enforce FIFRA, though enforcement is largely delegated to states. States may monitor pesticide residues in foods sold in their state, and they may conduct inspections of places where pesticides are used or manufactured. States also enter into agreements with the EPA to train and certify restricted-use pesticide applicators.

Workers' Compensation Insurance¹³

In some states, agricultural workers are excluded from workers' compensation coverage. In states that include agricultural workers, benefit levels vary depending on the state policy.

To be compensated, the worker has to prove that the health issue is related to their work. They have to provide a legal "preponderance of evidence" that the disease is work-related. Insurance companies usually don't dispute minor claims or claims that are obviously work-related (e.g. acute pesticide poisonings with lab results and symptoms consistent with established toxicology). However, companies commonly dispute expensive claims, such as those related to a death or a permanently disabling injury. Clinicians and patients may also encounter difficulties when trying to prove the work-relatedness of a case that resembles common community-acquired illnesses, such as upper respiratory infections or gastroenteritis.

Clinicians should coordinate closely with patients when processing workers' compensation claims due to the risk it could pose to the patients' employment status in certain circumstances.

IV - Tomato Workers' Occupational Health and Safety - Selected Resources

* This is not meant to be a comprehensive list nor an endorsement of any particular organization.

Health Education

Training Programs

- Farmworker Health and Safety Programs by the Association of Farmworker Opportunity Programs: <http://afop.org/health-safety>

Materials (compilation of resources previously listed in this document)

- **Heat Illness**

- ◇ "Heat Illness Prevention: Training Materials for Educators" - http://deohs.washington.edu/pnash/heat_illness
- ◇ "Heat-Related Illnesses" report from Migrant Clinicians Network and Farmworker Justice - http://www.migrantclinician.org/files/resourcebox/heat_monograph.pdf
- ◇ Water, Rest, Shade Campaign Educational Resources from Cal/OSHA - <http://www.99calor.org/educational-resources>

- **Musculoskeletal**

- ◇ "¡Cuídate!" Patient Education for Musculoskeletal Injury Prevention - <http://www.migrantclinician.org/toolsource/resource/¡cuídate.html>
- ◇ "Ergonomic Guidelines for Manual Material Handling" - <http://www.cdc.gov/niosh/docs/2007-131/pdfs/2007-131.pdf>

- **Skin disorders**

- ◇ "Skin Conditions" by Farmworker Clinical Care Resource - <http://farmworkercliniciansmanual.com/index.php/common-health-conditions/skin-conditions>
- ◇ Review article: "The prevalence and possible causes of contact dermatitis in farmworkers" - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3667697>

- **Pesticides**

- ◇ Roberts, J., & Reigart, J. R. (2013). Recognition and management of pesticide poisonings. (6th ed.). Washington DC: Office of Pesticide Programs, U.S. Environmental Protection Agency. Retrieved from www2.epa.gov/pesticide-worker-safety
- ◇ "Pesticide Exposure Clinical Guidelines and Assessment Form" - <http://www.migrantclinician.org/toolsource/tool-box/pesticide-clinical-guidelines.html>

- ◇ Pesticide Education Manuals for Community Health Workers and Promotoras - <http://www.migrantclinician.org/toolsource/resource/little-bit-poisonwill-it-kill-youpoco-veneno-no-mata-pesticide-education-manual>
- ◇ <http://www.migrantclinician.org/toolsource/resource/aunque-cercasano-pesticide-training-manual.html>
- **Mental Health**
 - ◇ “Trauma-Informed Care in Behavioral Health Services” Treatment Improvement Protocol by SAMHSA - <http://store.samhsa.gov/shin/content//SMA14-4816/SMA14-4816.pdf>
 - ◇ Research article: “Migrant Farmworker Stress: Mental Health Implications” - http://dev.c pca.org/cpca/assets/File/Policy-and-Advocacy/Active-Policy-Issues/MSFW/MSFW_Migrant_Farmworker_Stress.pdf

Clinician Education Organizations

- Migrant Clinicians Network - www.migrantclinician.org
- National Center for Farmworker Health - www.ncfh.org

Agricultural Health and Safety Trainings

- There are eight NIOSH-funded agricultural health and safety centers across the U.S. that run research, education, and prevention projects, often in partnership with state agricultural cooperative extension offices.^{xix} For more information, visit <https://www.cdc.gov/niosh/oe/agctrhom.html>
- Additionally, some states’ occupational health and safety programs offer free consultations and/or training for agricultural employers and employees on health and safety topics.

Farmworker Health and Safety Policy and Regulations

- Clinician Guides for Farmworker Health and Safety Regulations: <http://www.migrantclinician.org/toolsource/resource/clinician-guides-farmworker-health-and-safety-regulations.html>
- Organizations
 - ◇ National Immigration Law Center - www.nilc.org
 - ◇ Farmworker Justice - www.farmworkerjustice.org
 - ◇ California Rural Legal Assistance - www.crla.org
 - ◇ Florida Rural Legal Services - www.frls.org

^{xix} <https://nifa.usda.gov/extension>

Workers' Organizations

The National Labor Relations Act (1935) protects workers' right to collective bargaining and to engage in union activity without retaliation from their employers, yet explicitly excludes agricultural employers and employees from the law (29 USC § 151).¹⁹ In California, farmworker labor organizing is protected by the California Agricultural Labor Relations Act (California Labor Code § 1140.2).

- **United Farm Workers:** Union representing tomato workers at certain farms in the California San Joaquin Valley

“Many companies, let’s say, don’t take people into account, but we here, since we have the union, we have protections, we have someone to support us, even more, we understand our rights.”

- **Coalition of Immokalee Workers:** Worker-led human rights organization that collaborates with tomato workers, tomato growers, retail buyers, consumer networks, and allied community advocacy groups to improve farm working conditions in the southeastern U.S.

“The Coalition -- they help us as workers, they protect workers. So they talk with the owners of the company and say, “You know what? This is happening.” Whatever thing that is happening at work, they can talk with the company and tell them what is happening.

- **Farm Labor Organizing Committee:** Union that has historically represented workers who harvested processing tomatoes in the U.S. Midwest

Tomato Work in Popular Press

Books

- Tomatoland by Barry Estabrook
- Tangled Routes: Women, Work, and Globalization on the Tomato Trail by Deborah Barndt
- Fields of Resistance: The Struggle of Florida’s Farmworkers for Justice by Silvia Giagnoni

Documentaries

- Food Chains - www.foodchainsfilm.com

References

1. National and Local Weather Forecast. (2015). Retrieved August 31, 2015, from <http://www.weather.com>
2. Relative Humidity (%) for Selected Cities in the Southeast. (2007). Retrieved August 31, 2015, from <https://www.sercc.com/climateinfo/historical/avgrh.html>
3. Heat Illness Prevention: Training Materials for Educators. (n.d.). Retrieved September 1, 2015, from http://deohs.washington.edu/pnash/heat_illness
4. Rao, P. (2007). Heat Related Illnesses: An Occupational Health Concern for Farmworkers. Retrieved from http://www.migrantclinician.org/files/resourcebox/heat_monograph.pdf
5. Davis, K. G., & Kotowski, S. E. (2007). Understanding the ergonomic risk for musculoskeletal disorders in the United States Agricultural Sector. *American Journal of Industrial Medicine*, 50(7), 501-511. <http://doi.org/10.1002/ajim.20479>
6. Fathallah, F. a. (2010). Musculoskeletal disorders in labor-intensive agriculture. *Applied Ergonomics*, 41(6), 738-743. <http://doi.org/10.1016/j.apergo.2010.03.003>
7. Gamsky, T. E., McCurdy, S. A., Wiggins, P., Samuels, S. J., Berman, B., & Schenker, M. B. (1992). Epidemiology of Dermatitis among California Farm Workers. *Journal of Occupational Medicine*, 34(3), 304-310.
8. Paulsen, E., Christensen, L. P., & Andersen, K. E. (2012). Tomato contact dermatitis. *Contact Dermatitis*, 67(6), 321-7. <http://doi.org/10.1111/j.1600-0536.2012.02138.x>
9. Larramendi, C. H., Ferrer, A., Huertas, A. J., Garcia-Abujeta, J. L., Andreu, C., Tella, R., ... Carnés, J. (2007). Sensitization to tomato peel and pulp extracts in the Mediterranean Coast of Spain : prevalence and co-sensitization with aeroallergens. *Clinical and Experimental Allergy*, 38, 169-177. <http://doi.org/10.1111/j.1365-2222.2007.02865.x>
10. Schenker, M. B., & Mccurdy, S. A. (1990). Occupational Health Among Migrant and Seasonal Farmworkers : The Specific Case of Dermatitis. *American Journal of Industrial Medicine*, 18, 345-351.

11. Rutledge, A., Wills, J., & Bost, S. (1999). Commercial Tomato Production. Knoxville, TN. Retrieved from <https://extension.tennessee.edu/publications/Documents/pb737.pdf>
12. Estabrook, B. (2012). *Tomatoland*. Kansas City, MO: Andrews McMeel Publishing, LLC.
13. Roberts, J., & Reigart, J. R. (2013). Recognition and management of pesticide poisonings. *Internal Medicine Journal* (6th ed.). Washington DC: Office of Pesticide Programs, U.S. Environmental Protection Agency. Retrieved from www2.epa.gov/pesticide-worker-safety
14. Farquhar, S., Samples, J., Ventura, S., Davis, S., Abernathy, M., McCauley, L., ... Shadbeh, N. (2008). Promoting the occupational health of indigenous farmworkers. *Journal of Immigrant and Minority Health*, 10(3), 269–280. <http://doi.org/10.1007/s10903-007-9075-5>
15. Snipes, S. A., Cooper, S. P., & Shipp, E. M. (2016). “The only thing I wish I could change is that they treat us like people and not like animals”: Injury and Discrimination among Latino farmworkers. *Journal of Agromedicine*, 22(1), 36–46. <http://doi.org/10.1080/1059924X.2016.1248307>
16. Kim, N. J.-E., Vásquez, V. B., Torres, E., Nicola, R. M. B., & Karr, C. (2016). Breaking the Silence: Sexual Harassment of Mexican Women Farmworkers. *Journal of Agromedicine*, 21(2), 154–162. <http://doi.org/10.1080/1059924X.2016.1143903>
17. Southern Poverty Law Center. (2013). *Close to Slavery: Guestworker Programs in the United States*. Montgomery, AL. Retrieved from www.splcenter.org
18. Holmes, S. M. (2013). *Fresh Fruit, Broken Bodies: Migrant Farmworkers in the United States*. Berkeley: University of California Press.
19. Liebman, A. K., Wiggins, M., Fraser, C., Levin, J., Sidebottom, J., & Arcury, T. A. (2013). Occupational health outcomes for workers in the agriculture, forestry and fishing sector: Implications for immigrant workers in the southeastern US. *American Journal of Industrial Medicine*, 56, 975–984. <http://doi.org/10.1002/ajim.22170>
20. U.S. Department of State, *Trafficking in Persons Report*, 338 (2010), cited in Southern Poverty Law Center. (2013).
21. Coalition of Immokalee Workers. (2012). About CIW. Retrieved May 1, 2016, from <http://www.ciw-online.org/about>

22. Johansson, B., Rask, K., & Stenberg, M. (2010). Piece rates and their effects on health and safety – A literature review. *Applied Ergonomics*, 41(4), 607–614. <http://doi.org/10.1016/j.apergo.2009.12.020>
23. Tonozzi, T. R., & Layne, L. A. (2016). Hired Crop Worker Injuries on Farms in the United States : A Comparison of Two Survey Periods From the National Agricultural Workers Survey. *American Journal of Industrial Medicine*, 59, 408–423. <http://doi.org/10.1002/ajim.22578>.
24. U.S. Department of Labor Wage and Hour Division. (2008). Fact Sheet #49: The Migrant and Seasonal Agricultural Worker Protection Act. Retrieved from <https://www.dol.gov/whd/regs/compliance/whdfs49.pdf>
25. Sellers, S., & Asbed, G. (2011). The History and Evolution of Forced Labor in Florida Agriculture. *Race/Ethnicity: Multidisciplinary Global Contexts*, 5(1), 29–49.
26. Hiott, A. E., Grzywacz, J. G., Davis, S. W., Quandt, S. A., & Arcury, T. A. (2008). Migrant Farmworker Stress: Mental Health Implications. *Journal of Rural Health*, 24(1), 32–39.
27. Grzywacz, J. G., Quandt, S. A., Chen, H., Isom, S., Kiang, L., Vallejos, Q., & Arcury, T. A. (2010). Depressive Symptoms Among Latino Farmworkers Across the Agricultural Season: Structural and Situational Influences. *Cultural Diversity and Ethnic Minority Psychology*, 16(3), 335–343. <http://doi.org/10.1037/a0019722>
28. United States Department of Agriculture Economic Research Service. (2016). Fresh Tomato Industry. Retrieved May 1, 2016, from [http://www.ers.usda.gov/topics/crops/vegetables-pulses/tomatoes.aspx#Fresh tomato](http://www.ers.usda.gov/topics/crops/vegetables-pulses/tomatoes.aspx#Fresh%20tomato)
29. National Agricultural Statistics Service. (2015). Crop Values: 2014 Summary. Crop Values: 2014 Summary. Retrieved from http://usda.mannlib.cornell.edu/usda/current/CropValuSu/CropValuSu-02-24-2015_correction.pdf
30. Thompson, G. D., & Wilson, P. N. (1997). The organizational structure of the North American fresh tomato market: Implications for seasonal trade disputes. *Agribusiness*, 13(5), 533–547. [http://doi.org/10.1002/\(SICI\)1520-6297\(199709/10\)13](http://doi.org/10.1002/(SICI)1520-6297(199709/10)13)
31. Runyan, J. L. (2000). Summary of Federal Laws and Regulations Affecting Agricultural Employers. *Agricultural Handbook No. 719*.

32. Grzywacz, J. G., Lipscomb, H. J., Casanova, V., Neis, B., Fraser, C., Monaghan, P., & Vallejos, Q. M. (2013). Organization of Work in the Agricultural, Forestry, and Fishing Sector in the US Southeast: Implications for Immigrant Workers' Occupational Safety and Health. *American Journal of Industrial Medicine*, 56, 925–939. <http://doi.org/10.1002/ajim.22169>.
33. Tomatoes in the Open, Fresh Market - Acres Harvested (Average Across Time Periods). (2015). Retrieved August 31, 2015, from <http://quickstats.nass.usda.gov/data/maps/5E684BB9-1CCD-351C-8EA9-5DDDD3E4A39DF>
34. Tomato Growing Zone Maps. (2006). Retrieved August 31, 2015, from <https://www.tomatofest.com/tomato-growing-zone-map.html>
35. USDA Economic Research Service - Tomatoes. (2012). Vegetables and Pulses. Retrieved from <http://www.ers.usda.gov/topics/crops/vegetables-pulses/tomatoes.aspx>
36. Miller, B., & Fathallah, F. A. (2006). The Effects of a Stooped Work Task on the Muscle Activity and Kinematics of the Lower Back. *Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting*, 1284–1288.
37. University of Massachusetts Amherst Center for Agriculture, Food, and the Environment. (2017). Fumigation: Materials and Risks. Retrieved from <https://ag.umass.edu/fruit/general-information/fumigation-materials-risks>
38. Mossler, M., Aerts, M. J., & Nesheim, O. N. (2012). Florida Crop / Pest Management Profiles : Tomatoes. Retrieved from <https://edis.ifas.ufl.edu/pi039>
39. National Agricultural Statistics Service. (2014). United States Summary and State Data. 2012 Census of Agriculture (Vol. 1). Washington DC. Retrieved from <http://www.agcensus.usda.gov/Publications/2012>
40. Carroll, D., Georges, A., & Saltz, R. (2011). Changing Characteristics of U.S. Farm Workers: 21 Years of Findings from the National Agricultural Workers Survey. *Immigration Reform and Agriculture Conference*. Retrieved from <https://migrationfiles.ucdavis.edu/uploads/cf/files/2011-may/carroll-changing-characteristics.pdf>
41. H-2A Temporary Agricultural Workers. (2015). Retrieved from <http://www.uscis.gov/working-united-states/temporary-workers/h-2a-agricultural-workers/h-2a-temporary-agricultural-workers>

42. Silver, K., Hoffman, K., Loury, S., Fethke, N. B., Liebman, A., Manz, N., ... Florence, J. (2014). A campus-community partnership for farmworkers' health: interventions for tomato workers in Tennessee. *Progress in Community Health Partnerships : Research, Education, and Action*, 8(4), 501-10. <http://doi.org/10.1353/cpr.2014.0056>
43. National Agricultural Statistics Service. (2014). United States Summary and State Data. 2012 Census of Agriculture (Vol. 1). Washington DC. Retrieved from <http://www.agcensus.usda.gov/Publications/2012>
44. Schierow, L., & Esworthy, R. (2012). Pesticide Law : A Summary of the Statutes. CRS (Congressional Research Service) Report.
45. U.S. Environmental Protection Agency (2015). Pesticides; Agricultural Worker Protection Standard Revisions. Retrieved from <https://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2011-0184-2510>
46. Kirkhorn, S. R., Earle-Richardson, G., & Banks, R. J. (2010). Ergonomic Risks and Musculoskeletal Disorders in Production Agriculture: Recommendations for Effective Research to Practice. *Journal of Agromedicine*, 15(3), 281-299. <http://doi.org/10.1080/1059924X.2010.488618>
47. Mnif, W., Ibn, A., Hassine, H., Bouaziz, A., Bartegi, A., & Thomas, O. (2011). Effect of Endocrine Disruptor Pesticides : A Review. *International Journal of Environmental Research and Public Health*, 8, 2265-2303. <http://doi.org/10.3390/ijerph8062265>
48. Ending Abuses and Improving Working Conditions for Tomato Workers, Hearing of the Committee on Health Education, Labor, and Pensions, Senate, 110th Cong. 1 (2008). <https://www.gpo.gov/fdsys/pkg/CHRG-110shrg41881/pdf/CHRG-110shrg41881.pdf>
49. Faucett, J., Meyers, J., Miles, J., Janowitz, I., & Fathallah, F. (2007). Rest break interventions in stoop labor tasks. *Applied Ergonomics*, 38(2), 219-226
50. Fair Food Standards Council. (2015). Fair Food Program 2015 Annual Report. Sarasota, FL. Retrieved from <http://fairfoodstandards.org/15SOTP-Web.pdf>

