



Managing Heat Stress when Mixing, Loading, and Applying Pesticides ¹

O. Norman Nesheim²

This document explains the advantages of promptly recognizing and dealing with occurrences of the illness labeled heat stress. See Table 1 and Table 2.

Background

Heat stress is the illness that occurs when the body builds up more heat than it can cope with. Heat stress is not caused by exposure to pesticides, but may affect pesticide handlers working in hot conditions. Wearing personal protective equipment--clothing and devices that protect the body from contact with pesticides--can increase the risk of heat stress by interfering with the body's natural ability to cool down.

Avoid Heat Stress

Several factors work together to cause heat stress. Before beginning a pesticide-handling task, think about whether any of these factors are likely to be a problem. Consider making adjustments in the task itself or in the workplace conditions, including:

- heat factors--temperature, humidity, air movement, and sunlight;

- workload--the amount of effort a task takes;
- personal protective equipment (PPE);
- drinking water intake; and
- scheduling.

Heat and Workload

High temperatures, high humidity, and sunlight increase the likelihood of heat stress. Air movement, from wind or from fans, may provide cooling. Because hard work causes the body to produce heat, a person is more likely to develop heat stress when working on foot than when driving a vehicle or flying an aircraft. Lifting or carrying heavy containers or equipment also increases the likelihood of overheating.

Cooling Systems and shade

Use fans, ventilation systems (indoors), and shade whenever possible. A work area or vehicle sometime can be shaded by a tarp or canopy or provided with fans, awnings or air conditioners. Consider wearing cooling vests-garments with ice or frozen-gel inserts that help keep the body cool.

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2. O. Norman Nesheim, Ph.D., professor and pesticide information coordinator, Food Science and Human Nutrition Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611-0710.

Allow time to adjust

People who have become used to working in the heat are less likely to be affected by heat stress. To become adjusted to hot work environments, do about two hours of light work per day in the heat for several days in a row; then gradually increase the work period and the workload for the next several days. An adjustment period of at least seven days is recommended. If the warm weather occurs gradually, handlers may adjust naturally to working in hot conditions.

Personal Protective Equipment (PPE)

Pesticide handling tasks often require the use of extra clothing layers and other PPE. These items keep pesticides from getting on the skin, but they also interfere with natural body cooling that happens when sweat evaporates. A person can get overheated quickly when wearing PPE.

Level of PPE

Select a level of PPE appropriate for the pesticide being used with the pesticide label itself as a guide to the minimum PPE. Use personal experience and PPE selection guides to help decide whether more protection is needed. Do not over-protect if heat stress is a concern, but wear whatever is necessary. In general, the more protective the PPE is, the more it adds to the heat load.

Select coolest possible PPE

Choose PPE that is designed to be as cool as possible or that provides a cooling effect, such as a powered air-purifying respirator or, when appropriate, back-vented coveralls.

Whenever it is practical, choose coveralls that allow air to pass through. Woven fabrics (cotton, or cotton-polyester blends) allow air to pass through fairly easily. Rubberized or plastic fabrics and fabrics coated with chemical-resistant barrier layers allow almost no air to pass through. Nonwoven polyolefin (Tyvek®) fabrics allow little air passage. Nonwoven polypropylene and polyester/wood pulp fabrics vary in their resistance to air flow, depending on how they are constructed.

Drinking Water Intake

Evaporation of sweat cools the body. Under the conditions that lead to heat stress, the body produces a large amount of sweat. Unless the water lost in sweat is replaced, body temperature will rise.

Drink enough water

Drink plenty of water before, during, and after work during heat stress conditions. Do not rely on thirst alone to guide you. A person can lose a dangerous amount of water before feeling thirsty, and the feeling of thirst may stop long before fluids are replaced.

Maintain weight

Be sure to keep body weight fairly constant. All weight lost because of sweating should be regained every day. People working in heat-stress conditions should weigh themselves before work every day and keep weight constant by drinking plenty of water.

Scheduling

When the combination of temperature, sunlight, humidity, workload, and PPE is likely to lead to overheating, use scheduling to avoid heat stress.

Work during the coolest times

Schedule tasks requiring the heaviest workload or the most PPE during the coolest part of the day.

Use work/rest cycles

When heat stress risk is high, schedule frequent breaks to allow the body to cool. Consider using a work/rest cycle guide to decide how long to work before taking a break.

Remember that people differ in their ability to work in hot conditions. Most work/ rest cycle guides are based on an average of many people who are adjusted to the heat and the workload. Workers who have not had time to adjust should work less time than the guide indicates.

When using recommended work/rest cycles, continue to be alert for possible heat-stress problems. Anyone who gets dangerously hot should stop work

immediately and cool down. If necessary, shorten the time between breaks.

Stop work

The above steps will prevent most heat stress problems. But under extremely hot conditions when cooling devices cannot be used, it may be necessary to stop work until conditions improve.

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Table 1.

Table 1. Signs and Symptoms of Heat Stress	
<p>Heat stress, even mild heat stress, makes people feel ill and impairs their ability to do a good job. They may get tired quickly, feel weak, be less alert, and less able to use good judgment.</p>	<p>Learn the signs and symptoms of heat stress and take immediate action to cool down if you observe:</p>
	<p>fatigue (exhaustion, muscle weakness),</p>
<p>Severe heat stress (heat stroke) is a serious illness. Unless victims are cooled quickly, they can die. Severe heat stress is fatal to more than 10 percent of its victims--even young, healthy adults. Victims may remain sensitive to heat for months and be unable to return to the same work.</p>	<p>headache, nausea, and chills,</p>
	<p>dizziness and fainting,</p>
	<p>loss of coordination,</p>
	<p>severe thirst and dry mouth,</p>
<p>Heat cramps can be painful. These are muscle spasms in the legs, arms, or stomach caused by loss of body salts through heavy sweating. To relieve cramps, drink cool water or "sports drinks." Stretching or kneading the muscles may temporarily relieve the cramps.</p>	<p>altered behavior (confusion, slurred speech, quarrelsome or irrational attitude).</p>
	<p>If there is a chance that stomach cramps are being caused by pesticides rather than salt loss, get medical help right away.</p>

Table 2.

Table 2. First Aid for Heat Stress	
<p>It is not always easy to tell the difference between heat stress illness and pesticide poisoning. The signs and symptoms are similar. Don't waste time trying to decide what is causing the illness. Get medical help right away.</p>	<p>Get the victim into a shaded or cool area.</p>
	<p>Cool victim as rapidly as possible by sponging or splashing skin, especially face, neck, hands, and forearms, with cool water or, when possible, immersing in cool water.</p>
	<p>Carefully remove all PPE and any other clothing that may be making the victim hot,</p>
	<p>Have the victim, if conscious, drink as much cool water as possible.</p>
	<p>Keep the victim quiet until help arrives.</p>
	<p>Severe heat stress (heat stroke) is a medical emergency! Cool victim immediately. Brain damage and death may result if treatment is delayed.</p>