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Why should pesticide applicators care about heat stress?

This is a CEU article

By Ryan Atwood
and Steve Futch

Farmers utilize pesticides to maintain productivity and profitability in their agricultural operations. When applying pesticides, personal protective equipment (PPE) is required by law and these requirements are found on the label. PPE acts as a barrier between the applicator and

the pesticide chemical. Most PPE is non-porous, which is a good trait for keeping pesticides off of your skin. However, materials that do not have pores restrict air movement out of the PPE, limiting your ability to remain cool, and can lead to an increase in body temperatures. Increased temperatures can potentially cause health problems for pesticide applicators if proper precautions are not taken.

Florida's environment is warm, even downright hot during the summers. Unfortunately, pests and diseases seem to really enjoy these warm conditions and many pesticide applications often occur during the warmer months. Pesticide applicators need to be aware of heat stress and plan accordingly to minimize its impact.

Heat stress is the buildup of heat in the body from working muscles while in warm to hot environments. Heat exhaustion and heat stroke occur when the body is subjected to more heat than it can handle. During both rest and work, your body tries to maintain a body temperature of 98.6° F. Hot weather, heat sources or hard work will raise the body's core temperature. In your body, the heated blood is pumped to the skin's surface, where body heat is transferred to the environment, if it is cooler. If heat needs to be transferred quickly, the body produces sweat. Sweat carries the heat outside of the skin, where it evaporates to aid in cooling the body. PPE can significantly reduce the evaporation of sweat, preventing your body from properly cooling itself. If your body cannot cool itself, you have the potential for heat stress.

Why should you care about heat stress? Because individuals working in agriculture have the highest incidence of heat-related illness and pesticide handlers are at even greater risk due to wearing required PPE that will limit the cooling process.

It is important to plan your activities appropriately to help prevent heat stress. During the warmer months, you may want to start the work day earlier while cooler temperatures are present and minimize working during the hottest time periods. Additionally, one needs to stay well hydrated by drinking plenty of water. During heavy work, a person can lose 1 to 2 quarts of water per hour. After two to three

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hours of water loss, you lose endurance, feel hot, uncomfortable and thirsty. The longer the body sweats, the less blood there is to carry excess heat to the skin or oxygen and nutrients to the brain and muscles. Dehydration symptoms include headaches, muscle fatigue, loss of strength, heat cramps, reduced alertness and nausea. Without fluid replacement during an extended period of work, the body risks exhaustion. Untreated heat exhaustion can lead to heat stroke. Plenty of water is the key to cooling the body!

There are other factors to consider that may make one more susceptible to heat-related illnesses such as age, weight, degree of physical fitness, and if one is acclimated to weather conditions. Over-consumption of caffeine, use of drugs or alcohol, medical conditions, type of clothing worn or previously having heat injury all increase the likelihood of heat stress occurring.

HEAT DISORDERS AND HEALTH EFFECTS

Heat rashes, cramps, collapse, fatigue, exhaustion and stroke are all potentially problems for pesticide applicators. Heat rashes occur on the body, particularly where clothing or PPE is restrictive. Heat cramps are caused by too much or too little salt and are often attributed to electrolyte imbalances caused from excessive sweating. Products such as Gatorade and Powerade help replenish some of these electrolytes. Heat collapse or fainting can occur when the brain does not get enough oxygen due to blood pooling in the extremities. Heat exhaustion can lead to headaches, nausea, vertigo, weakness, thirst and giddiness. Heat exhaustion can affect alertness and judgment, which can potentially lead to other problems. All of these effects can cause significant injury to your body and future health.

If you suspect someone is suffering from heat exhaustion, they should be removed from the hot environment, encouraged to rest and cooled down as quickly as possible. If they are wearing PPE, remove the outer layer of clothing and moisten with water to aid in the cooling process. Additionally, the individual should be given fluids. If action is not taken to cool the person, the potential for heat stroke can occur. Heat stroke is a medical emergency in which the body cannot properly regulate its temperature. Primary signs involve confusion, irrational behavior, loss of consciousness, convulsions, lack of sweating, hot dry skin and

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elevated body temperatures. If these conditions occur, you should seek immediate medical assistance.

So how do you provide an adequate work environment in which to prevent heat stress? Make sure that adequate cool water is available for pesticide applicators at all times and encourage employees to drink plenty of water. Schedule spray activities for the cooler parts of the day or night and increase the number and length of breaks as the weather gets warmer. Ensure that new employees are acclimated to the warm weather. Educate employees on the importance of drinking plenty of water before, during and after work while minimizing the amount of caffeine and alcohol consumption when working in warmer weather conditions. Make sure all employees understand the warning signs and symptoms of heat-related illnesses. Have an emergency plan in place for workers that may be showing signs of heat-related illnesses to ensure prompt actions are taken to address these serious medical conditions.

Ryan Atwood is an Extension agent at the Lake County Extension Service, Tavares; Stephen Futch is an Extension agent at the Citrus Research & Education Center, Lake Alfred.

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Pesticide applicators and heat stress test

To receive one Core continuing education unit (CEU), read "Why should pesticide applicators care about heat stress?" in the September issue of *Citrus Industry* magazine. Answer the 20 questions and mail the answers and applicator form to the senior author. The article and test set will be valid for up to one year from the publication date. After one year, they expire and CEU credit will no longer be available to obtain one CEU credit.

1. _____ is the key to cooling the body!
2. PPE acts as a barrier between _____ and the pesticide chemical.
3. During hot and heavy work conditions, an individual can lose _____ to _____ quarts of water per hour.
4. Heat exhaustion can affect _____ and _____ which can potentially lead to other problems.
5. Heat _____ and heat _____ occur when the body is subjected to more heat than it can handle.
6. Pesticide applicators need to be aware of heat stress and plan to _____ its _____.
7. Individuals in _____ have the highest incidence of heat-related illnesses.
8. Name three other factors that may make one susceptible to heat stress.

9. During warmer months, you may want to apply pesticides earlier in the day to avoid _____.
10. Heat stroke is a _____.
11. When applying pesticides, _____ is required by _____ and these requirements are found on the _____.
12. Make sure all _____ understand the warning signs and symptoms of _____ illnesses.
13. So how do you provide an adequate work environment in which to prevent heat stress?

14. If you suspect someone is suffering from heat exhaustion, they should be _____ from the _____, _____ to _____ and _____ as quickly as possible.
15. List three things that heat exhaustion can lead to:

16. List three of the primary signs of heat stroke:

17. Schedule _____ for the _____ of the day or night and increase the _____ and _____ of breaks as the weather gets warmer.
18. Products such as Gatorade and Powerade help replenish some of these _____.
19. _____ or _____ can occur when the brain does not get enough oxygen due to blood pooling in the extremities.
20. During both rest and work, your body tries to maintain a body temperature of _____ F.

Pesticide Applicator Form

First Name: _____ Last Name: _____

Email: _____

Pesticide License Number _____

Address _____

City _____ State _____ Zip: _____

Phone Number: _____

Please mail the answer sheet and form to:
Lake County Extension Office, Attention: Ryan Atwood, 1951 Woodlea Road, Tavares, FL 32787

For questions regarding this test, please contact Ryan Atwood at (352) 343-4101 or by email at raatwood@ufl.edu