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## Cooperative Extension - Columbia County

Savannah Rapids Pavilion  
3300B Evans to Locks Road  
Martinez, Georgia 30907-4903

Telephone: (706) 868-3413

FAX Number: (706) 868-3418

E-Mail: [uge3073@uga.edu](mailto:uge3073@uga.edu)

Web site: [www.ugaextension.com/columbia](http://www.ugaextension.com/columbia)

### **EXTENSION WISE AND OTHER WISE**

**By Carl Varnadoe, County Extension Agent  
Agricultural & Environmental Sciences**

Jack Frost is cool. *Literally*. He was everywhere at my house (yours too I suppose) this past week giving the landscape that chilly frosty look that only frost can. Even the poor livestock that sleep outside had Jack Frost riding their backs.

Just who the heck is Jack Frost anyway? Why does he always get the blame for cold damage on plants? Would it surprise you to know that old Jack isn't always the culprit? The mystery of frost and freezes associated with winter in Georgia will need a little explanation in order to clear Jack Frost's good name.

Try to stay with me on this. Though the science of frost can sound kind of confusing it really is quite simple. First let's consider cold temperatures and how frost occurs. Basically, temperatures are hot, cold and somewhere between these two extremes. The temperature of an object indicates the amount of heat energy associated with that object. Obviously, we can sense if something is hot or cold by touch, however thermometers must be used to accurately determine how hot or cold something is.

When water vapor is cooled to a temperature of 32° or less, it freezes and forms frost. Put another way, in order for frost to form, water vapor must be exposed to freezing temperatures. What this means is that the surface on which frost forms must cool to freezing (32° or below) before frost ever forms. Still with me?

When air that contains a lot of moisture (water vapor) physically contacts a surface, like a plant leaf for example, that is colder than the air; the air that is in direct contact with the leaf is cooled. As this humid air cools, water vapor from the air spontaneously condenses onto the cool surface as frost if the temperature of that solid surface (the leaf) is below 32°. To put it another way, the water vapor in the air condenses into dew if the temperature of the solid surface (the leaf) is above freezing or forms frost if the leaf surface is at or below freezing. For all you trivia buffs, please note that liquid water is not directly involved in frost formation. During frost formation, water vapor changes from a gas directly into ice crystals without going through a liquid phase. It's some kind of Holiday magic I guess.

Perhaps we sometimes get the wrong idea about the occurrence of frost because we often see frost on plants when the air temperature is above freezing. The reality is that the air temperature according to the local weatherman (or your thermometer) does not have to reach 32° for plant leaves to get cold enough to cause frost. During radiant cooling on clear, cool nights, solid surfaces (including plant leaves) lose heat more rapidly than the surrounding air. As a result, temperatures of solid surfaces such as leaves, rooftops, etc. may fall below 32° and cause frost to occur even though the air temperature is above freezing.

Plant tissue is, therefore, not actually injured by Jack Frost. Plants are injured by Jack's evil cousin, Mr. Freeze (or the freezing of plant liquids within plant tissues). This injury occurs in susceptible plants when the temperature inside the tissue drops low enough to cause freezing. Plants, especially warm season vegetables, are injured when the tissue within a plant freezes, regardless of the presence or absence of frost. Frost, therefore, is nothing more than a visual confirmation that the temperature of the leaf or other surface on which frost formed dropped to 32° or less.

So who the heck is Jack Frost? He's certainly not the guy that killed your prized petunias. And contrary to popular belief he's not nipping at your nose either. Blame Jack's evil cousin Mr. Freeze for plant damage and nose nipping. Who is Jack Frost? *He's cool.*



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