

# Freeze protection of tropical fruit crops in Florida: winter patterns and cautionary considerations

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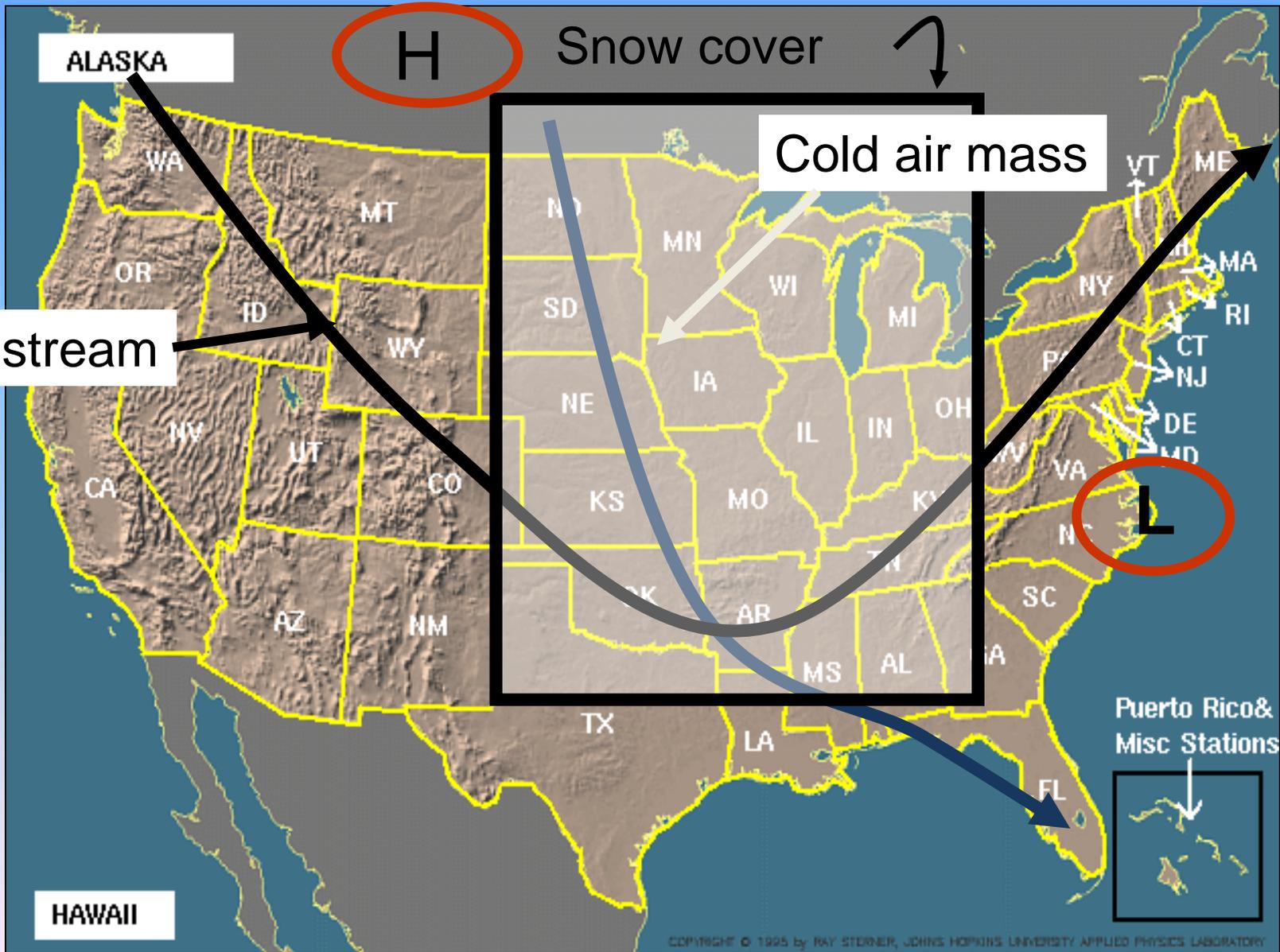
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# Is freezing weather on the way?

- Be on the alert from late Nov. through March. Be prepared by mid-Nov.
- Watch the jet stream pattern: moving cold air from NW to SE.
- Is there a low pressure system over the SE, around the Carolinas and W. Virginia?
- Watch for a large Arctic high pressure system - large cold air mass.
- Watch for snow cover over mid-west and central US.
- Is there a high pressure center just west of Minnesota?
- Is there a high pressure center west of Tallahassee, FL?

# Is freezing weather on the way?



# Is freezing weather on the way or rules of thumb

## What to watch for

- In advance of predicted cold weather we experience one or more days when the temperature does not exceed 65°F.
- Days when the temperature is at or below 60°F at 3:00 PM or earlier in the afternoon.
- We experience 2 or more days and/or nights of cold but nonfreezing weather, especially if they are accompanied by wind.
- Snow cover over the northwest, midwest, and middle US.
- The forecast calls for a low night-time dew point temperatures below 30°F or less.

# Is freezing weather on the way or rules of thumb

## What to watch for

- Cold high pressure systems which move out of Canada to the south. These systems cross the US-Canadian border anywhere from Montana to Wisconsin.
- They take 2-4 days to reach Florida.
- Record low temperatures are reported for the mid-western US states.
- Winds at the surface (low level winds) are blowing from the north-northwest.
- Florida is the predicted target of a cold high pressure system.

# What to watch for

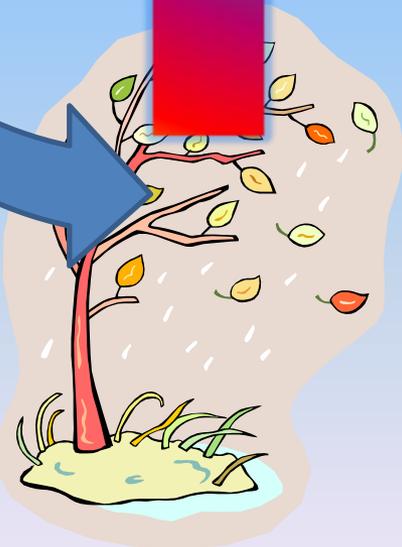
- Normally we experience two days (nights) of freezing weather. The first night is usually an advective freeze and the second night an radiation freeze.
- Caution: both types of freeze may occur on the same night.
- A fair estimation of the lowest temperature -
  - can be gotten by subtracting 20 degrees off the air (°F) temperature taken at sunset and;
  - the predicted night time dew point low is a fair estimate of the lowest temperature (caution: dry air may cause dew points to fall further)
  - by recording the dew pt and air temperature at sunset and using the minimum overnight temperature tool on FAWN ([http://fawn.ifas.ufl.edu/tools/minimum\\_temperature/](http://fawn.ifas.ufl.edu/tools/minimum_temperature/))

# Advection freezing weather

- Advection freezes are freezes where a large cold air mass brings freezing and subfreezing temperatures to Florida. They are characterized by windy conditions.
- No inversion layer is established.
- The heat from all exposed objects is constantly removed by the windy conditions.
- Is a more difficult type freeze to protect trees from.

# Advectional freeze

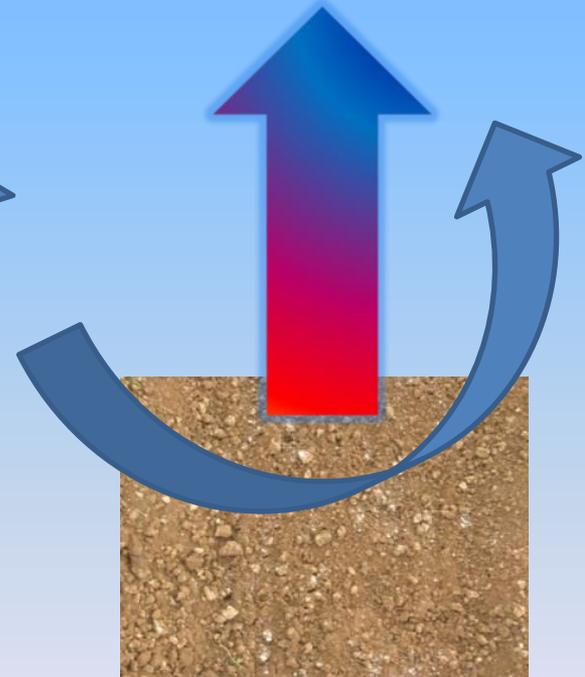
*Heat from all objects blown away by the wind*



Plants



buildings



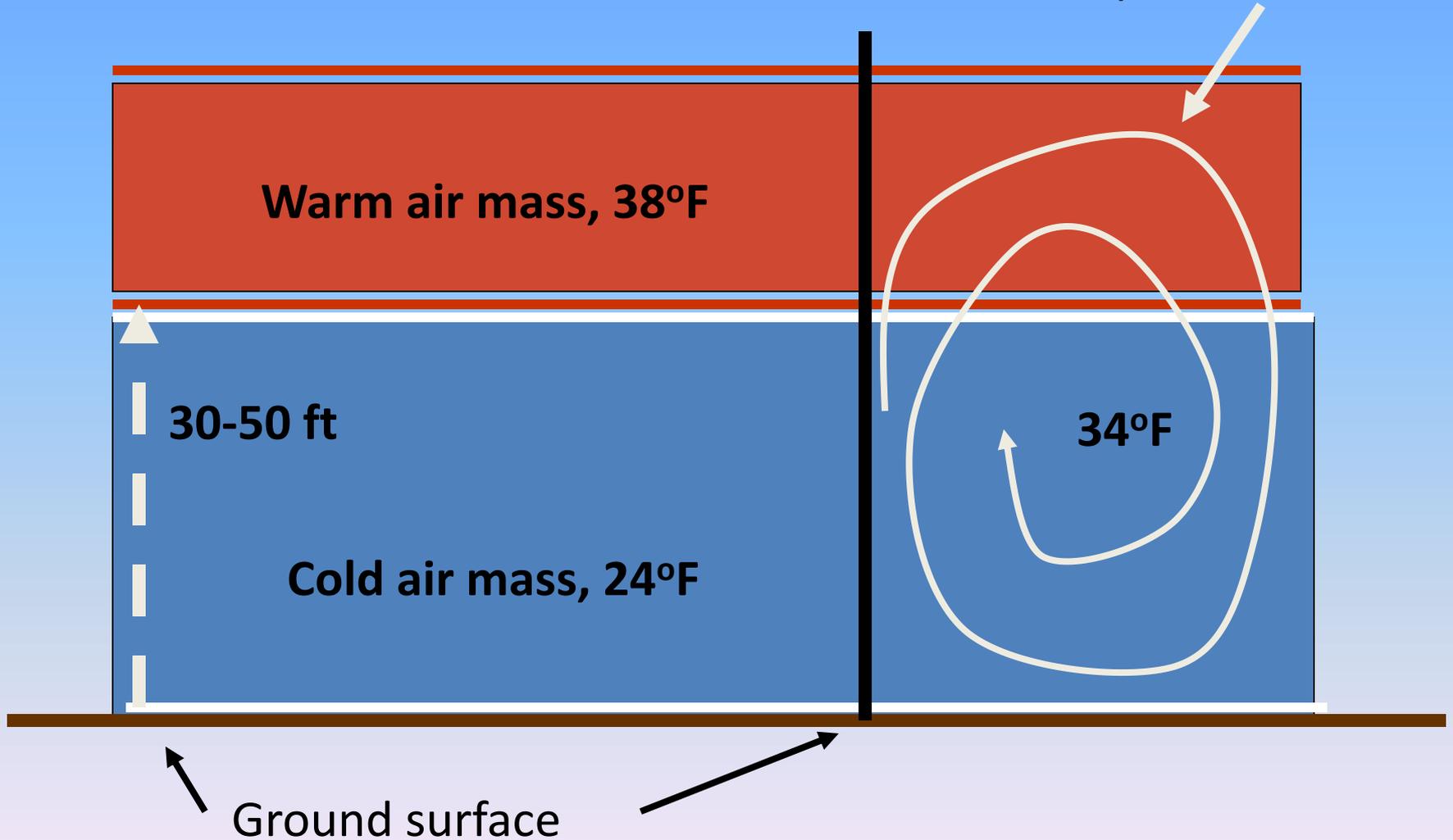
soil/ground

# Radiation freezing weather

- Radiation freezes happen when there is little or no cloud cover and little or no wind. Heat from all surfaces radiate to outer space - there is nothing to block the escape of heat waves from the earth's surface.
- A temperature inversion (TI) may occur during a radiation freeze. A TI may occur when a warmer air (usually 30-50 ft up) layer exists above a cold/freezing layer of air along the ground. When there is a difference of at least 5 degrees between these layers, mixing them can raise the air temperature in the grove.

# Radiation freeze

Mix air layers  
by wind machine or  
helicopter



# A freeze is predicted !

- Closely monitor the weather - both predictions and what is occurring in your area (remember the signs).
- Remember: most weather forecasts are for urban areas and most NWS temperature gauges are located at airports or in urban areas - these places are always warmer!
- Watch/listen to more than one weather source and get a handle on how much colder your site usually is compared to adjacent urban areas.
- Test your system!
- Pre-freeze irrigate grove floor several days ahead.

# Watch out for

- The temperatures dropping very rapidly (4-10 degrees in about 1-2 hours) into the 30s within an hour to several hours right after sunset (usually in winter that is between 5:30PM-6:00PM).
- This may occur when we have low dew points (at or below 32°F), low relative humidity conditions (for So. Fla. that means below ~40%), and clear skies during the day light hours prior to the night-time freeze event. When the air mass (atmosphere) is dry we get rapid cooling after sunset.

# It's freeze time

- Throughout the night
  - monitor temperatures
  - cloud cover
  - weather forecasts
  - wind direction and speed
  - monitor and repair any broken or clogged sprinkler heads
  - go outside!
- Many times our freezing weather comes in twos - in other words two nights of freezing weather - be prepared (e.g., fuel, parts, etc.)!

# Scouting the weather conditions

- Check the weather throughout the night – it may change dramatically one or more times!
- **Go outside!**
- Drive and/or walk around.
- Take or look at the in-grove temperatures.
- Look at the sky.
- Sense the wind direction and speed.
- Sense the cold at ground and near ground level; look for frost.

# Using the Internet

- National Weather Service
  - <http://www.weather.gov>
- AgroClimate
  - <http://agroclimate.org>
- Intellicast
  - <http://www.intellicast.com>
- Weather Underground
  - <http://www.wunderground.com/>
- University of Florida, IFAS FAWN
  - <http://fawn.ifas.ufl.edu/>
  - Real time tracking
  - Tools
  - Critical temperatures
  - Forecasts
- <http://trec.ifas.ufl.edu/>
  - Freeze protection of tropical fruit crops in Florida

# Other local weather sites

- Miami-Dade County Cooperative Extension Service (<http://miami-dade.ifas.ufl.edu/>)
  - Weather Issues
    - Weather Stations
- Homestead General Airport
  - Phone only at 305-247-2791
- Homestead Air Reserve Base (<http://rap.ucar.edu/wether/surface/>)
  - *Go to* Retrieve text format METARs
  - *Insert* khsp
  - *Hit* Translated
  - Retrieve

# Recommendations

- Be prepared by mid-November
- Monitor the weather, nationally, regionally, locally and in your grove
- Good luck!