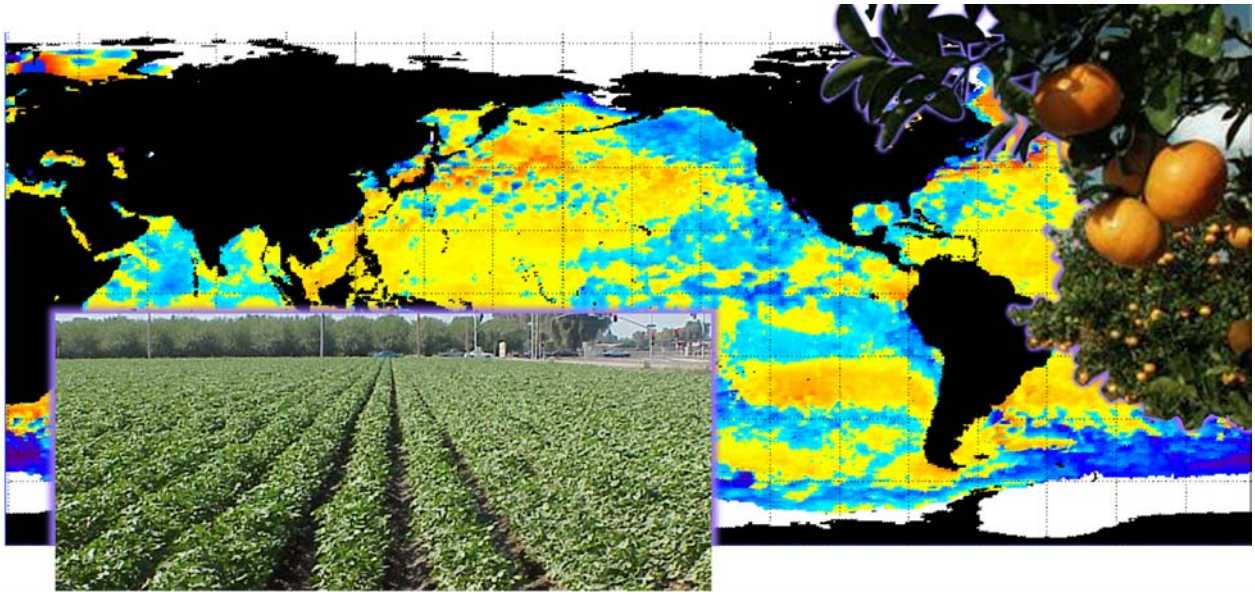
Lesson Plan

Using Climate Forecasts in Agriculture



SART Training Media

Using Climate Forecasts in Agriculture

Lesson Plan

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SART Training Media are available for download from the Florida SART Web site <www.flsart.org>.

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Contents

About Florida SART

SART is a group of governmental and private agencies dedicated to effectively communicating and planning for animal and agriculture emergencies and disasters in Florida.

SART operates at the local level through county SART organizations.

SART combines the skills and resources of many agencies, organizations and individuals.

SART supports county, regional, and state emergency management efforts.

SART Mission

Empower Floridians with training and resources to enhance animal and agriculture disaster response.

SART Goals

- Promote the establishment of a coordinator in each county responsible for all agriculturally related incidents
- Provide assistance in the development and writing of county ESF-17 plans
- Promote the establishment of a County SART for each county
- Provide annual training for all SART and agriculturally-related personnel
- Identify county resources available for an emergency or disaster
- Promote counties to work at a regional level for mutual aid

Subject: **Introduce basic concepts about climate, specifically the El Niño and La Niña phenomena and their impact on the southeastern United States. Introduce participants to the AgClimate Web site and the tools it provides.**

Introduction

This lesson plan and its accompanying workbook are the basis for an introductory unit on the use of climate forecasts in agriculture. The lesson plan guides the instructor or trainer in presenting the educational portion of the workshop. The mechanics of planning the training event or an entire workshop are covered in the companion manual, *Make It Happen! A Toolkit for Planning a Community-Based SART Training Event*. The toolkit is available for download at the Florida SART Web site <www.flsart.org>.

A PowerPoint presentation has been created to accompany the lesson. Throughout the lesson plan, slide symbols indicate that a PowerPoint slide is available for that section. Slides are also reproduced in the back of this lesson plan for use as a flipbook with small classes or making overheads.

Session Outline

Specific Learning Objectives

At the end of this training module, participants will be able to:

1. Explain **climate** and how it is different from **weather**.
2. Explain the value of climate forecasts to agriculture.
3. Explain **El Niño** and **La Niña events** and how knowing about these climate events helps agriculture?
4. Explain how El Niño and La Niña events affect **rainfall**.
5. Explain how El Niño and La Niña events affect **temperatures** in the Southeast U.S.
6. Explain how El Niño and La Niña events affect **freezes**.
7. Explain how El Niño and La Niña events affect the chance of **hurricanes** hitting the U.S.
8. Explain how El Niño and La Niña events affect the risk of **wild fires**.
9. Explain how El Niño and La Niña events affect **crop production** in the Southeast U.S.
10. Explain **degree-days**, **growing degree-days** and **heat-stress degree-days**.
11. Describe the **AgClimate Web site**.

Learning Environment/Aids

To complete this lesson plan, you will need:

- The PowerPoint presentation "Using Clilmate Forecasts in Agriculture"
- Optional: *Using Clilmate Forecasts in Agriculture* Workbook. This participant workbook contains copies of the PowerPoint slides and resource information.
- Optional: *Make It Happen! Toolkit for Planning a Community-Based SART Training Event*. This publication is available to help you organize, plan and present an entire CART training event with multiple training modules.
- (See the Resources section of this publication to find out more about any of the materials listed above.)

To conduct this training module, you will need:

- A means to show the PowerPoint presentation: a computer with a projector. (Note: Black-and-white copies of the slides are included in this manual if you prefer to use an overhead projector.)
- Sufficient seating for all participants.

Each participant will need:

- Pen or pencil
- *Using Climate Forecasts in Agriculture* Workbook, or paper for notes

Before the Workshop

On the day of the workshop, check that all equipment needed is in place. Double-check that electronic media works on the equipment you have. Also, make certain that any materials, such as paper, workbooks, and pens/pencils for participants, are available in sufficient numbers to cover all participants.

Part 1: Beginning the Session

Time: 5-10 minutes

Focus: Welcome participants and introduce unit objectives

SLIDES 1-3

Once all participants have taken their seats, welcome them to the "Using Climate Forecasts in Agriculture" workshop. Introduce yourself and any other trainers. Tell them approximately how long the session will last.

At this point, you may elect to give particpants the pre-test provided in this manul. Together with the post-test, this can be used to evaluate the knowledge participants gained during the session.

This workshop can be used with agricultural and non-agricultural audiences. The purpose of this lesson is to introduce concepts about climate and climate forecasting, and how this knowledge can be useful to agricultural producers. Specifically, the AgClimate Web site will be introduced along with the tools it provides. Details about using the AgClimate tools is beyond the scope of this introductory lesson.

The introduction should not last longer than 10 minutes. It is necessary for the trainer to balance staying on time, explaining the unit content clearly, and allowing for and answering participant questions.

SLIDE 4

Introduce participants to the Southeast Climate Consortium. Six institutions in Alabama, Florida, and Georgia participate in the Consortium and are working to bring the latest climate forecasting research to agricultural producers in the form of practical tools. The primary way of providing this information is through the AgClimate Web site at <www.agclimate.org>.

SLIDE 5

Take a moment to review the objectives for the workshop. This will help participants focus on what they are going to learn about and recognize topics as they come up in the workshop.

Part 2: Climate and Weather

Time: 5-10 minutes

Focus: Explain climate and how it is different from weather

SLIDE 6

Weather is a familiar concept -- weather is what is happening in the atmosphere at any specific point in time, such as the day-to-day measurements of temperature and rain.

Weather deals with short-term effects that result from the movement and development of particular weather systems (such as cold and warm fronts or hurricanes). Predicting the weather is a standard feature in news broadcasts and newspapers. These predictions are usually fairly accurate for one, two or three days, but because the atmosphere changes very quickly, weather predictions for more than a few days into the future are not as reliable.

Examples of weather include thunderstorms with their heavy rain and strong winds that might be caused by a cold front moving through a particular area. A lack of rain on any given day is also weather -- good weather for outdoor activities. A hard freeze is also a kind of weather.

Farmers, foresters and other agricultural managers can use weather to decide what activities are appropriate in the very near future, such as how much irrigation might be needed, whether to protect crops from freeze or frost, and whether chemical spraying and fertilizing are advisable on a given day.

Climate is a pattern of weather for one month or more in a certain region. When people discuss the total amount of rain for a month or a season, they are discussing the results of a pattern of weather. When the average temperature during a particular month is consistently above average, that is a pattern of weather, and therefore, climate.

Local climate can be influenced by remote conditions. For example, the temperature of the ocean in the Pacific Ocean near the Equator has a definite influence on the climate in the southeastern United States. A great deal of research has gone into this subject, and it has yielded many practical results.

Farmers, foresters and other agricultural managers now can know months ahead of time if less rain or more rain than normal will happen during different seasons in a year. This knowledge may change what crops to plant, how

much to irrigate and when to harvest.

For example, when equatorial waters in the Pacific are cooler than normal, the climate in south Florida is likely to be hotter and drier than normal with night temperatures above 65°F. With this knowledge, tomato producers might choose hot-set tomatoes as the variety that will produce best under these conditions.

Part 3: The Value of Climate Forecasts to Agriculture

Time: 5-10 minutes

Focus: Explain the value of climate forecasts to agriculture

SLIDE 7

Climate influences production and pricing of food, feed and fiber. Most crop failures in the United States are related to too little or too much rain. Differences in climate among the seasons are related to other production risks, such as pests and disease. Knowing possible climate shifts in the coming season helps farmers, foresters and other agricultural managers decide ahead of time how to deal with these risks. Better information about climate changes can help producers minimize climate-associated risks.

Examples of other production decisions that could be influenced by climate forecasts include:

- Choice of crop and variety
- Whether to buy crop insurance and how much to buy
- Amount and types of fertilizers and pesticides to buy

Part 4: El Niño and La Niña Events

Time: 5-10 minutes

Focus: Explain El Niño and La Niña and how knowing about these climate events helps agriculture

SLIDES 8

As mentioned earlier, sea surface temperatures near the equator in the Pacific Ocean can influence the climate in the southeastern United States. Sea surface temperatures can either be higher than average, lower than average, or they can be average. It takes months for the SST to change, so for example, if it is higher than normal, it can be several months to a year or more before it returns to normal or becomes lower than normal. The period of time during which the SST is high, low or normal is called a "phase" or sometimes an "event."

Normal SST is different depending on the time of year. During December through February, the normal SST is 75°F - 80°F.

SLIDES 9

The warmer than normal phase is called "El Niño," which refers to the infant Jesus. The reason for this name is that the warmer than normal phase has been known for hundreds of years to Peruvian fishermen, who often noticed decreased catches when December waters were warmer than usual. Much later, it was discovered that the same waters can be colder than usual, and a natural name for this opposite condition was "La Niña." When SST is normal, the phase is called "Neutral." So, when reading about climate issues, one might read about an "El Niño phase," an "El Niño event," or possibly just "El Niño."

SST is the most important surface condition that influences climate, particularly in the tropical parts of the world.* El Niño and La Niña have strong effects on climate patterns around the world.

SLIDES 10

Normally, trade winds blow from east to west near the Equator in the Pacific Ocean. These winds pile up warm water around Indonesia and Australia. During El Niño phases, trade winds die down and the warm water moves back towards the coast of South America. This makes the SST much warmer than normal.

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* The tropical part of the world is the area around the world between the Tropic of Cancer and the Tropic of Capricorn. The Tropic of Cancer is 23.5 degrees north of the equator and runs through Mexico, the Bahamas, India and southern China. The Tropic of Capricorn is 23.5 degrees south of the equator and runs through Australia, Chile, southern Brazil and northern South Africa.

During La Niña phases, stronger than usual trade winds bring up cooler water from the depths of the Pacific Ocean. This makes the SST in the eastern tropical Pacific Ocean lower than normal.

El Niño and La Niña phases return every 2 to 7 years. One does not always follow the other. For example, a La Niña phase began in 1988 followed by Neutral phases during 1989 and 1990; then, in 1991, an El Niño phase developed.

SLIDES 11

Most of the time, however, the tropical Pacific Ocean is in a Neutral phase or near normal SST.

Part 5: How El Niño, La Niña Affect Rainfall

Time: 5-10 minutes

Focus: Explain how El Niño and La Niña affect rainfall

SLIDE 12-15

During El Niño phases, average winter rainfall increases all across Florida by over 30%, compared to normal winter totals.

La Niña phases have the opposite effect. Rainfall can be from 10% to 30% less than normal from fall through winter and spring.

El Niño's influence on rainfall makes a difference in the production of several commodities in Florida, including winter vegetables, some citrus, sugarcane and field corn. More clouds during cooler and wetter winters cause plants to get less energy from the sun. Weather patterns of El Niño in winter also increase the possibility of disease which can affect the production of winter vegetables.

For example, in the winter of 1982-1983, one of the strongest La Niña phases caused winter storms that beat up California and the Gulf Coast. Average sea surface temperature decreased by as much as 4°F.

Part 6: El Niño, La Niña and Temperatures

Time: 5-10 minutes

Focus: Explain how El Niño and La Niña affect temperatures

SLIDE 16-18

The differences between average temperatures from season to season are much greater than the average temperature change caused by El Niño or La Niña. However, in Florida, any movement away from normal temperatures is important, especially during winter. During El Niño events, Florida and the Gulf Coast have average temperatures 2 to 3°F below normal. During La Niña events, winter temperatures are 2 to 4°F above normal. La Niña's affect on temperature is more noticeable in north Florida, Alabama and Mississippi.

For example, in 1998-2000, La Niña caused drier and warmer winters in Florida. This caused an increase in wild fires in the state. Other parts of the country were drier and warmer than normal.

The effects of El Niño and La Niña phases on winter average daily minimum temperatures are not as strong. In south Florida, however, average daily minimum summer temperatures are likely to be lower than normal during La Niña phases. Lower temperatures at night may be good for growth and yield of some crops.

Higher average temperatures associated with La Niña can have an effect on livestock. For example, dairy cows are sprayed with water several times a day when temperatures are high. Water keeps them cool and keeps up their milk production. Heat-stressed cows produce less milk than cool cows.

Part 7: El Niño, La Niña and Freezes

Time: 5-10 minutes

Focus: Explain how El Niño and La Niña affect freezes

SLIDE 19-20

Eleven of the 12 freezes that seriously damaged agriculture over the last 103 years (1894-1997) in the southeast happened during Neutral years. For example, very damaging freezes occurred in December 1962 and January 1982 during Neutral years.

Depending on where you are in Florida, damaging freezes with temperatures of 20°F or lower are up to 3 times more likely during Neutral years than during El Niño and La Niña events. Similar freezes may happen once every few years. For example, Alachua County may have a damaging freeze once every 5 years; south Florida may have over 20 years in between severe freezes.

Freezes that last longer than 2 nights are extended freezes, and they can severely damage some agriculture enterprises, such as aquaculture in central Florida. South Florida may have one extended freeze in 20 years, but Calhoun County in Florida's Panhandle, on the other hand, may have two extended freezes in a single year.

Another measure of the impact of freezing temperatures are the dates of the first frost and the last frost. For example, in Columbia County, there is a 50% chance that the first freeze will be between November 21 and November 30. Columbia County has a 50% probability that the last freeze will be between April 21 and April 30. El Niño and La Niña do not appear to affect when the first or last frosts or freezes occur.

Part 8: El Niño, La Niña and Hurricanes

Time: 5-10 minutes

Focus: Explain how El Niño and La Niña affect the chances of hurricanes hitting the U.S.

SLIDE 21-22

Upper level winds over the Atlantic Ocean Basin are not suitable for the development of a lot of hurricanes during an El Niño phase. Fewer hurricanes mean the chance for one to strike the U.S. is less likely. On the other hand, La Niña helps hurricanes develop in the Atlantic Ocean Basin, which means a greater chance one or more hurricanes may strike the U.S. The chances of at least 2 hurricanes hitting the U.S. are 28% during El Niño, 48% in Neutral phases, and 66% during La Niña.

Recent examples of hurricanes formed during Neutral phases include Hurricane Andrew, which struck Miami-Dade County in August 1992. This powerful storm destroyed between 35% and 45% of 22,000 acres of commercial tropical fruit crops in Miami-Dade County. Hurricanes in the 2004 and 2005 seasons also occurred during a Neutral phase. The many storms of these two seasons caused extensive agricultural damage amounting to over $2 billion in both years.

Part 9: El Niño, La Niña and Wild Fires

Time: 5-10 minutes

Focus: Explain how El Niño and La Niña affect the risk for wild fire in the southeast U.S.

SLIDE 23-24

La Niña causes below normal rainfall beginning in the fall and lasting through spring. The long dry period runs into April, one of the driest months of the year. As a result, soil and forests can be extremely dry. This can cause an increased risk of fires the following spring and summer.

Fire records show that the number of acres burned in Florida each year is highly related to El Niño and La Niña. The records show an increase in the acres burned during La Niña, especially in south Florida. For 1981-1998, on average over 500,000 acres burned in Florida. Neutral years average around 200,000 acres burned. Wet El Niño winters seem to prevent forest fires. The Florida western Panhandle does not usually have a problem with forest fires because this area gets much more rainfall in a year than other parts of the state.

Part 10: El Niño, La Niña and Crop Production

Time: 5-10 minutes

Focus: Explain how El Niño and La Niña affect crop production in the southeast U.S.

SLIDE 25-29

El Niño and La Niña events can influence crop production through their interactions with weather. Past studies have shown that yields of several crops in the Southeast U.S. are affected by El Niño and La Niña phases.

Environmental variables such as temperature, rainfall and solar radiation strongly affect crop development and growth. Development refers to the timing of critical events in a plant's life. Growth refers to the increase in weight, volume, length, or area of part or all of the plant.

For example, the winter tomato yield is about 20% lower than average during El Niño events and about 8% higher during La Niña events. Field corn yields are 10% lower during El Niño events and almost 10% higher during La Niña events.

Part 11: Degree-days: Measuring the Energy for Growth

Time: 5-10 minutes

Focus: Explain degree-days, growing degree-days, and heat stress degree-days

SLIDE 30

Degree-days are a way of measuring the amount of energy available for growth. Researchers have found that for each developmental stage of a plant, there is a temperature below which growth slows significantly. This temperature is called the threshold, and for crops to grow effectively, there must be plenty of days during which the temperature is above this threshold.

SLIDE 31

There are several ways of calculating degree-days, but the most common is to find the average of a day's high temperature and the low temperature, then subtract the threshold temperature. For example, if the threshold for a particular crop is 60°F and the average temperature on a particular day is 65°F, then that day provided 5 degree-days for the crop.

SLIDE 32

We can add all daily degree-days together to find out how many total degree-days have occurred since a certain day, for a particular month, or since a planting date. Cumulative degree-days like this are often compared to past years to see if the current year is supplying more or less degree-days in the same period of time. Higher numbers of degree-days in a given month cause earlier flowering and maturity. El Niño and La Niña affect growing degree-days mainly December through February.

For example, in the months December through February in South Florida, certain winter crops may grow 5% to 10% faster than normal during a La Niña phase and 10% to 15% slower during an El Niño phase.

Degree-days can also be used as a way of measuring any above-normal heat that animals must endure. This is called heat-stress degree-days. For example, cattle and hog weight gain and milk production are less when temperatures are higher than 77°F.

SLIDE 33

Use heat stress degree-days to figure out if livestock have heat stress. Actual loss of animals depends on other things, such as whether temperatures at night are low enough for livestock to recover from the stress. During an El Niño phase, heat stress degree-days tend to be slightly lower March through May and higher in the summer. La Niña reduces heat stress degree-days in June and July. These differences are small compared to the total average heat stress degree-days in spring and summer.

Part 12: The AgClimate Web Site

Time: 5-10 minutes

Focus: Descirbe the AgClimate Web site and the tools it provides for producers

SLIDE 34-40

The **AgClimate** Web site (http://www.agclimate.org) provides information and tools on how to deal with changing climate forecasts for each season in the Southeast U.S. **AgClimate** includes climate forecasts connected with risk management tools and information for certain crops, forestry, pasture, and livestock. The menu that helps you navigate the Web site has:

- **AgClimate Tools**: (a) **Climate Risk**: Expected and past climate information, rain and average low and high temperatures for counties; and (b) **Harvest Yield Risk**: Expected yield based on soil type, planting date, and basic management practices for peanuts, potatoes and tomatoes. Yield forecasts exist for limited counties depending on the crop chosen.
- **Climate Forecasts:** Gives Southeast Climate Consortium (SECC) forecasts and connections (links) to other Web sites for national and international climate forecasts. Also includes:
  - County forecasts
  - Regional forecasts
  - National, linked to the National Oceanic Atmospheric Administration (NOAA)
  - International, linking to the International Research Institute for Climate Prediction (IRI)
  - El Niño Southern Oscillation (ENSO) forecast, reports current sea surface temperature (SST) conditions and what ENSO condition is expected to prevail during the next months
  - Hurricane forecasts for current year and a summary of hurricane forecasts from several sources
  - Freeze forecasts
- **Crops:** Gives producers management options and yield risk ratings fitted to climate forecasts, in addition to links to extension resources, market information and commodity-related industry Web sites. Currently, peanuts, potatoes and tomatoes are in the system but are not finished.
- **Forestry:** Gives forest fire activity possibility forecast based on the Keetch-Byram Drought Index (KBDI). Also has management options for other climate scenarios as well as links to extension resources and industry Web sites.

- **Pasture and Livestock:** Offers documentation of the effect of climate differences on pasture and hay and livestock production, such as planting cool and warm season grasses, fertilization, grazing and stocking rates, forage quality and pasture improvement.
- **Climate and El Niño**: Provides background information about the El Niño event in the tropical Pacific and how it influences the climate of the Southeast U.S., graphics and animation showing El Niño events' impact on temperature and rain across the region. It also includes links to general climate and weather resources on the Worldwide Web.
- **"Your Feedback"** and **"About**": "Your Feedback" section collects knowledge, thoughts, attitudes, and possible use of seasonal climate forecasts from visitors to AgClimate. The "About" section covers AgClimate and the SECC.

Part 13: Summary and Wrap-Up

Time: 5-10 minutes

SLIDE 41-43

Prior to answering your audience's final questions or comment, provide a summary of key points from the training session:

- Climate is a long-term pattern of weather.
- Climate is an important influence on weather.
- Patterns of warming in the equatorial Pacific have a strong effect on climate and weather in the southeast U.S.
- Degree-days are a useful way of measuring how much energy for growth is available.
- Degree-days can also be used to determine heat stress in livestock.
- The AgClimate Web site provides information and decision-making tools based on climate research.
- The AgClimate Web site can be found at: <www.AgClimate.org>.

Thank your audience for their attention and participation. Encourage them to visit the AgClimate Web site and learn more about the decision-making tools it provides. Participants may wish to know about other training units related to climate. Visit the Florida SART Web site to find out more.

Participant's Evaluation of *Using Climate Forecasts in Agriculture*

Please circle the number that best expresses your opinions about the following statements.

		Fully Dis-Agree	Dis-Agree	Neutral	Agree	Fully Agree
1.	The training module's format was appropriate.	1	2	3	4	5
2	The information presented is useful to me.	1	2	3	4	5
3.	The time it took to complete this module was acceptable.	1	2	3	4	5
4.	The reasons that climate can pose risks to agriculture were explained.	1	2	3	4	5
5.	The importance of climate forecasting was explained in sufficient detail.	1	2	3	4	5
6.	The climate phases -- El Niño, La Niña, and Neutral -- were adequately explained.	1	2	3	4	5
7.	The influence of climate phases on rainfall, temperature, and several other factors was adequately explained.	1	2	3	4	5
8.	It was clearly explained that the AgClimate Web site provides useful climate information for agricultural producers.	1	2	3	4	5
9.	As a result of the session, you are likely to look further into using the AgClimate Web site.	1	2	3	4	5

10. We welcome your comments about this program:

_____

_____

_____

_____

_____

Please use the back of this sheet for any further comments.

Thank you for your time!

Using Climate Forecasts in Agriculture Participant Pre-Test

This pre-test is intended to gauge the level of knowledge that you have **before** participating in the *Using Climate Forecasts in Agriculture* training. Please answer all the following questions to the best of your ability.

1. What is the major difference between climate and weather?

   _____

2. Climate forecasts can assist producers in what activity:

   _____

3 Name the three important climate features caused by sea surface temperature:

   _____

   _____

   _____

4. The climate phases listed in question 3 affect Florida agriculture most strongly in what season? _____

5. List six areas affected by the climate phases listed in question 3.

   _____ _____

   _____ _____

   _____ _____

6. Which climate phase can cause winter temperatures to be lower than normal?

   _____

7. However, damaging freezes are most likely during what climate phase?

   _____

8. Degree-days are a measure of: _____

   _____

   _____

9. List information items available through the AgClimate Web site that are most important to you.

   _____

   _____

   _____

   _____

Using Climate Forecasts in Agriculture Participant Post-Test

This post-test is intended to gauge the level of knowledge that you have **after** participating in the *Using Climate Forecasts in Agriculture* training. Please answer all the following questions to the best of your ability.

1. What is the major difference between climate and weather?

   _____

2. Climate forecasts can assist producers in what activity:

   _____

3 Name the three important climate features caused by sea surface temperature:

   _____

   _____

   _____

4. The climate phases listed in question 3 affect Florida agriculture most strongly in what season? _____

5. List six areas affected by the climate phases listed in question 3.

   _____ _____

   _____ _____

   _____ _____

6. Which climate phase can cause winter temperatures to be lower than normal?

   _____

7. However, damaging freezes are most likely during what climate phase?

   _____

8. Degree-days are a measure of: _____

   _____

   _____

9. List information items available through the AgClimate Web site that are most important to you.

   _____

   _____

   _____

   _____

Answer Key *to Climate Forecasts in Agriculture* Pre- and Post-Tests

1. **What is the major difference between climate and weather?**
   long-term versus short-term; duration; length of time

2. **Climate forecasts can assist producers in what activity:**
   planning; decision-making (some may list specific tasks, such as planting, etc.)

3 **Name the three important climate features caused by sea surface temperature:**
   El Niño, La Niña, and Neutral

4. **The climate phases listed in question 3 affect Florida agriculture most strongly in what season?**
   winter

5. **List six areas affected by the climate phases listed in question 3.**
   rainfall, temperature, freezes, hurricanes, wild fires, crop production

6. **Which climate phase can cause winter temperatures to be lower than normal?**
   El Niño

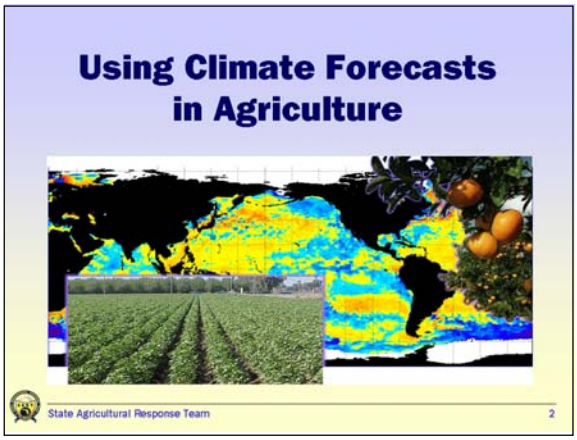
7. **However, damaging freezes are most likely during what climate phase?**
   Neutral

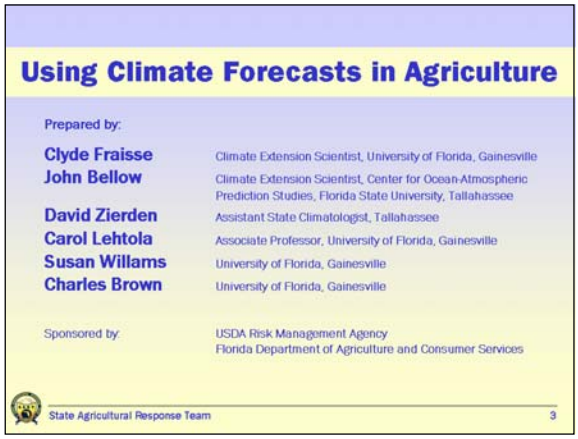
8. **Degree-days are a measure of:**
   the energy available for plant growht or development

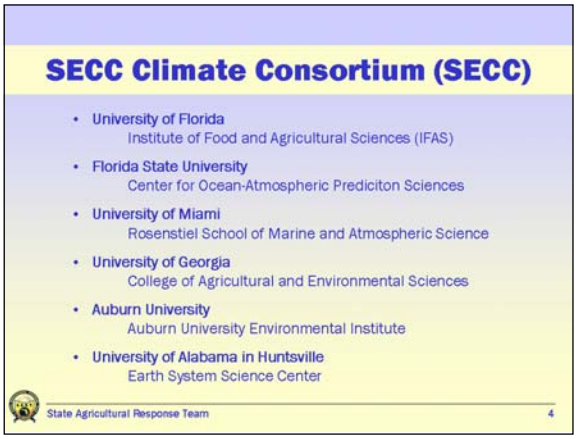
9. **List information items available through the AgClimate Web site that are most important to you.**
   (Answers will vary.)

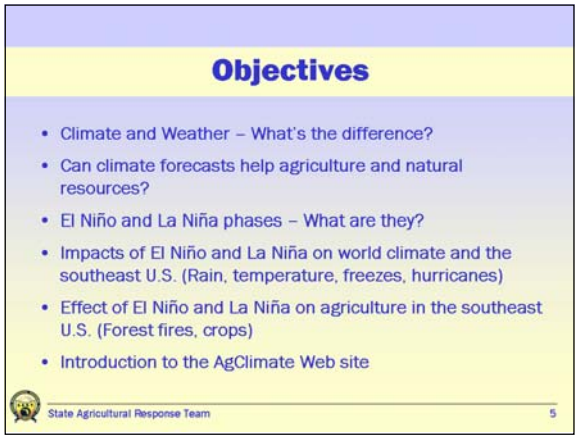
PowerPoint Slides

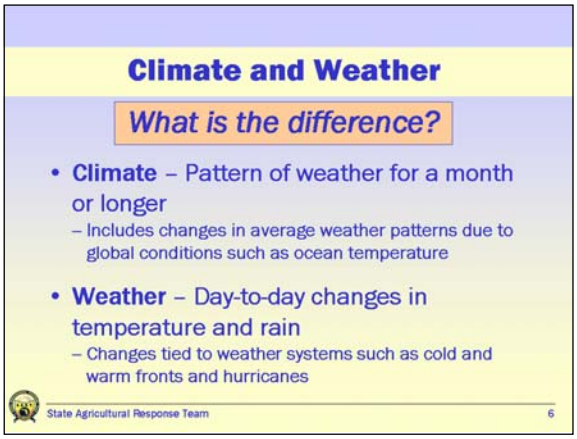
Slides 1-6











PowerPoint Slides

Slides 7-12

How do climate forecasts help Florida agriculture?

- Decide how to deal with the climate ahead of time
- Deciding ahead of time helps minimize risks to agriculture that may come with seasonal climate variability
- Examples: Climate forecasts can help producers choose which varieties to plant, how much crop insurance to buy, or what chemicals they will need.

State Agricultural Response Team 7

El Niño and La Niña: What are they?

- Caused by changes in sea surface temperature (SST) in the equatorial Pacific Ocean
- Strongly influence climate around the world
- Return every 2 to 7 years but do not always follow each other
- Affect production of winter vegetables and other crops in the southeast U.S.

State Agricultural Response Team 8

El Niño and La Niña Phases

- El Niño Phase – Warmer than normal sea surface temperature in the Pacific Ocean near the equator

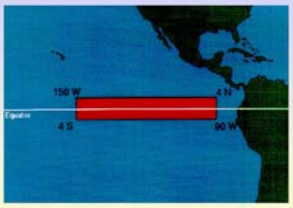
  Example: Strong El Niño phases in 1982-83 and 1997-98 caused excessive rainfall on the West Coast and the Gulf coast
- La Niña Phase – Cooler than normal sea surface temperature in the Pacific Ocean near the equator

  Example: 1998-99 and 1999-2000 La Niña phases caused drier and warmer winters in Florida. *Result:* increase forest fires; drier and warmer than usual temperatures in other parts of the U.S.

State Agricultural Response Team 9

Track El Niño and La Niña

Changes in water temperature in this red-shaded area of the Pacific Ocean on the equator near South America are monitored to track El Niño or La Niña phases



State Agricultural Response Team 10

Neutral Years

- Neither El Niño nor La Niña phases exist
- Surface water temperatures (SSTs) normal or near normal; SSTs are different at different times of the year but are usually from 75˚F to 80˚F in December through February
- Neutral phases are twice as likely to happen as either El Niño and La Niña

State Agricultural Response Team 11

El Niño and La Niña – Impact on SE US

- ✓ Rain
- ✓ Temperature
- ✓ Freezes
- ✓ Hurricanes
- ✓ Wild fires
- ✓ Crop production

State Agricultural Response Team 12

PowerPoint Slides

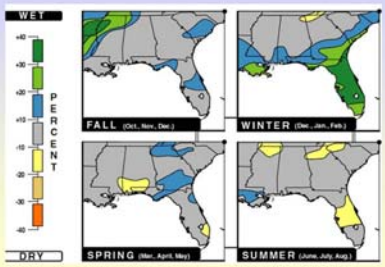
Slides 13-18

El Niño and La Niña and Rain

- El Niño Phase – Increase in average rain November to March; 30% more rain than normal amount
  - Extra El Niño winter rain can lower harvest of winter vegetables due to excessive moisture and low solar radiation
- La Niña Phase – Less than average rain November to March; 10% to 30% less than normal amount lasting from fall through winter and spring

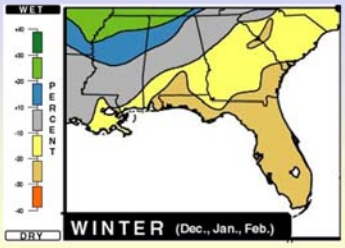
State Agricultural Response Team 13

El Niño Rain Changes



State Agricultural Response Team 14

La Niña Rain Changes



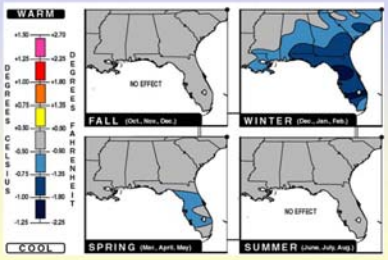
State Agricultural Response Team 15

El Niño and La Niña and Temperature

- El Niño Phase – Temperature 2˚F to 3˚F below normal in Florida and Gulf Coast during the winter
- La Niña Phase – Temperatures 2˚F to 4˚F above normal December through April and increase farther north in Florida
  - La Niña phase average daily minimum temperatures June through August likely to be lower than normal in south Florida

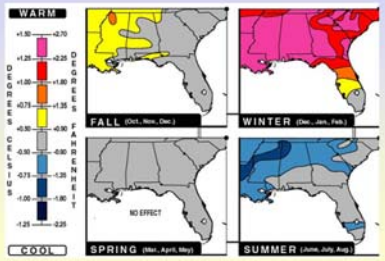
State Agricultural Response Team 16

El Niño Temperature Changes



State Agricultural Response Team 17

La Niña Temperature Changes



State Agricultural Response Team 18

PowerPoint Slides

Slides 19-24

El Niño and La Niña and Freezes

- More likely to happen in Neutral phases
- 11 of the 12 freezes that seriously damaged southeast agriculture in the last 103 years occurred in Neutral phase winters
- El Niño and La Niña phases do not appear to affect when first and last frost happen

State Agricultural Response Team 19

Freezes

Last 12 severe freezes in Central Florida were all during Neutral years

State Agricultural Response Team 20

El Niño and La Niña and Hurricanes

- El Niño Phase – Fewer hurricanes because upper level winds over Atlantic Ocean are not suitable; chance of a hurricane striking the U.S. is less likely
- La Niña Phase – Helps hurricanes develop in the Atlantic Ocean; greater chance that a hurricane may hit the U.S.

State Agricultural Response Team 21

Hurricanes

Chance of 2 hurricanes hitting the U.S.:

- 28% in El Niño
- 48% in Neutral
- 66% in La Niña

State Agricultural Response Team 22

La Niña and Wild Fires

In La Niña Phase –

- Below normal rain from fall into April, one of driest months of the year
- Soil and forests extremely dry; Increased risk of fires in spring and summer, especially in South Florida

State Agricultural Response Team 23

Wild Fires

- In El Niño Phase – Wet winters seem to lower the risk of wild fires
- Wild fires usually not a problem in western Panhandle – this area gets more rain than rest of state

State Agricultural Response Team 24

PowerPoint Slides

Slides 25-30

Weather Forecasts...

Help you decide when to

- Plant
- Spray
- Fertilize
- Irrigate

State Agricultural Response Team 25

Climate Forecasts...

Help you decide about

- Crop varieties
- Acreage allocation
- Crop insurance
- Marketing strategy

State Agricultural Response Team 26

Using Climate Forecasts

EXAMPLE:

During La Niña, central Florida strawberry growers plant varieties suitable for increased solar radiation

State Agricultural Response Team 27

Using Climate Forecasts

EXAMPLE:

During El Niño, potato growers crown fields and maintain drainage

State Agricultural Response Team 28

Climate Forecasts

EXAMPLES:

- Citrus growers irrigate to maintain soil moisture during La Niña winters
- Farmers decide on crop insurance and how much coverage to buy

State Agricultural Response Team 29

Degree-days and Development

Developmental stages and Required Degree-Days for Cotton*

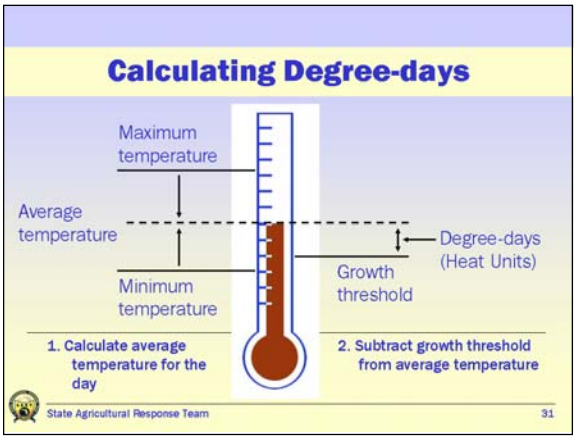
Developmental Stage	Heat Units or Degree-Days	Approx. Days
Planting	0	0
Seedling emergence	55	12
Add nodes to main stem	45-65 per node	3 days/node
First square	500	48
First bloom	850	68
Cutout	1300-1450	90-104
First open boll	1700	118
Harvest	2150-2300	148+

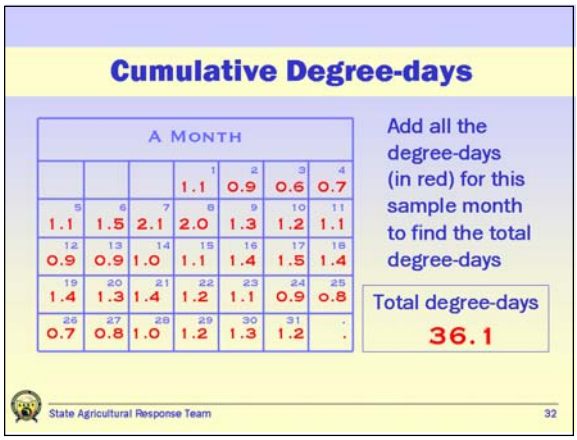
*Based on information from University of Missouri Extension

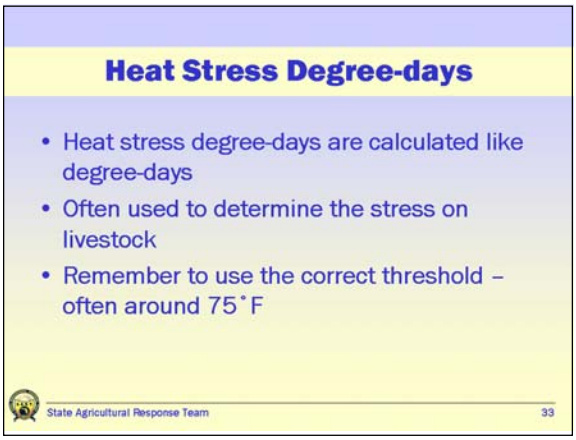
State Agricultural Response Team 30

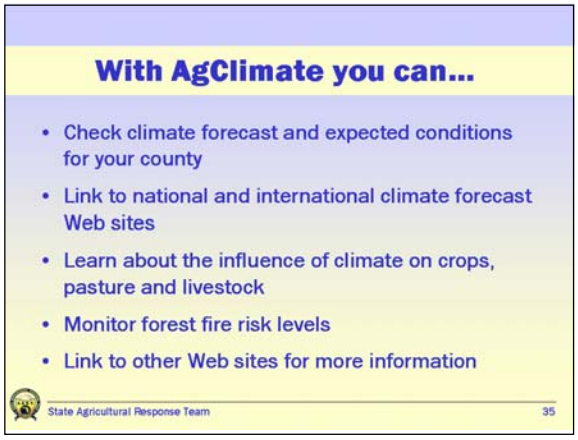
PowerPoint Slides

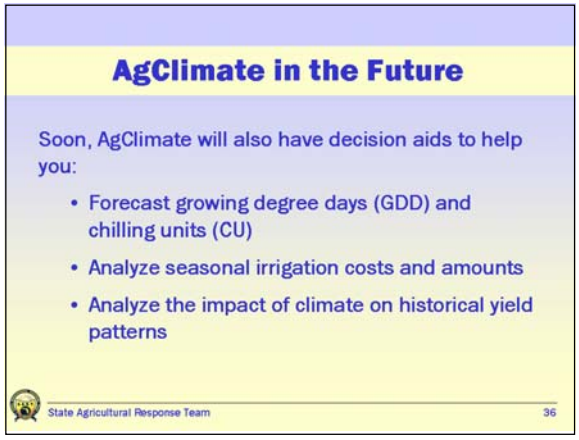
Slides 31-36





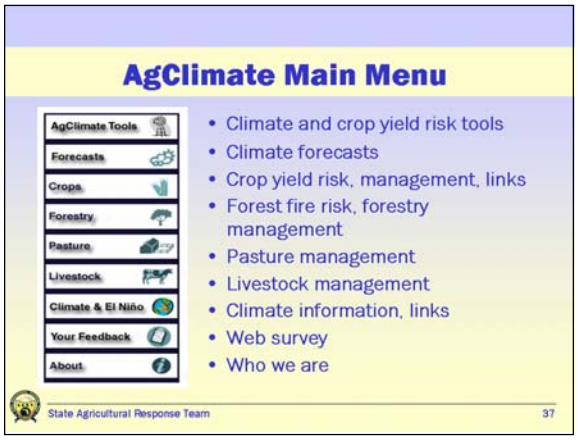


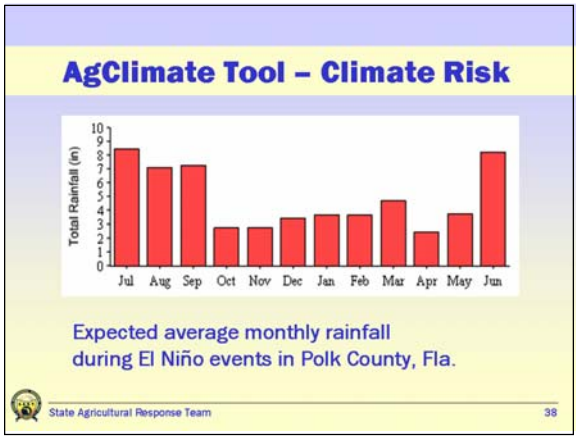


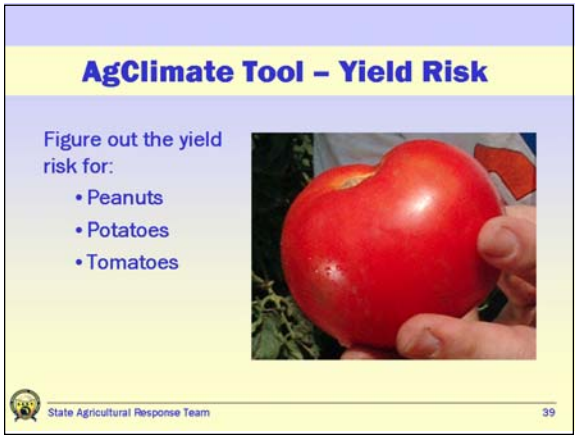


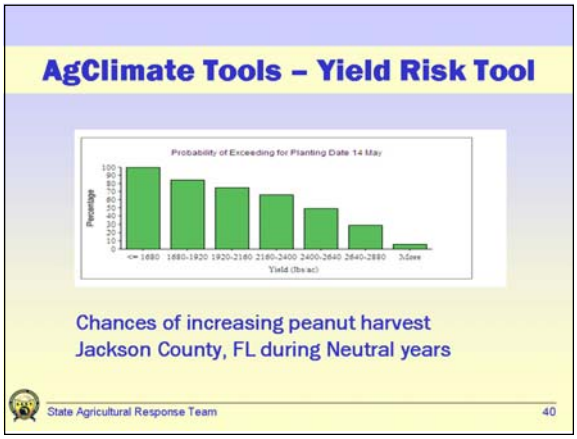
PowerPoint Slides

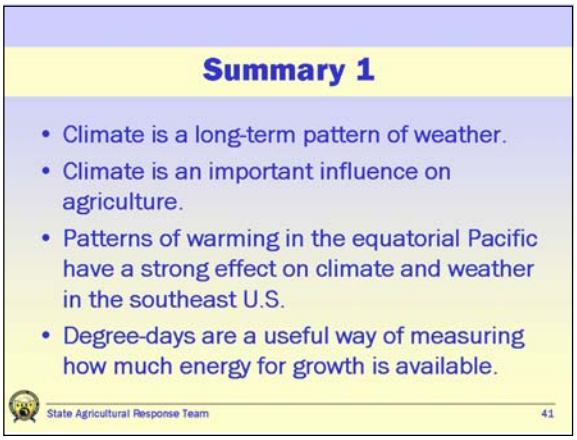
Slides 37-42

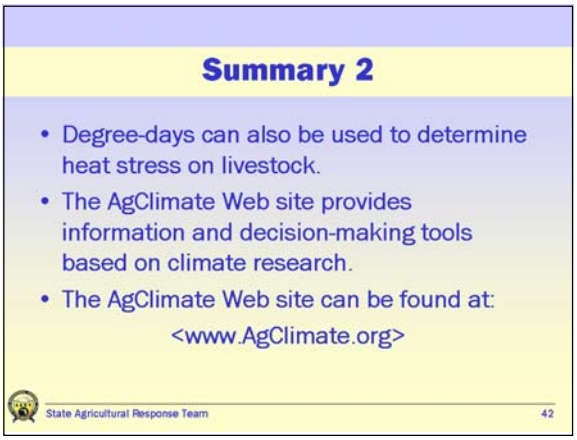












PowerPoint Slides

Slides 43

PowerPoint Slides

The "Using Climate Forecasts in Agriculture" PowerPoint slides are reproduced full-size on the following pages. You can use these pages as a display or photocopy them onto plastic overhead sheets for use with an overhead projector.

Color versions of these slides can be downloaded from the SART Web site:

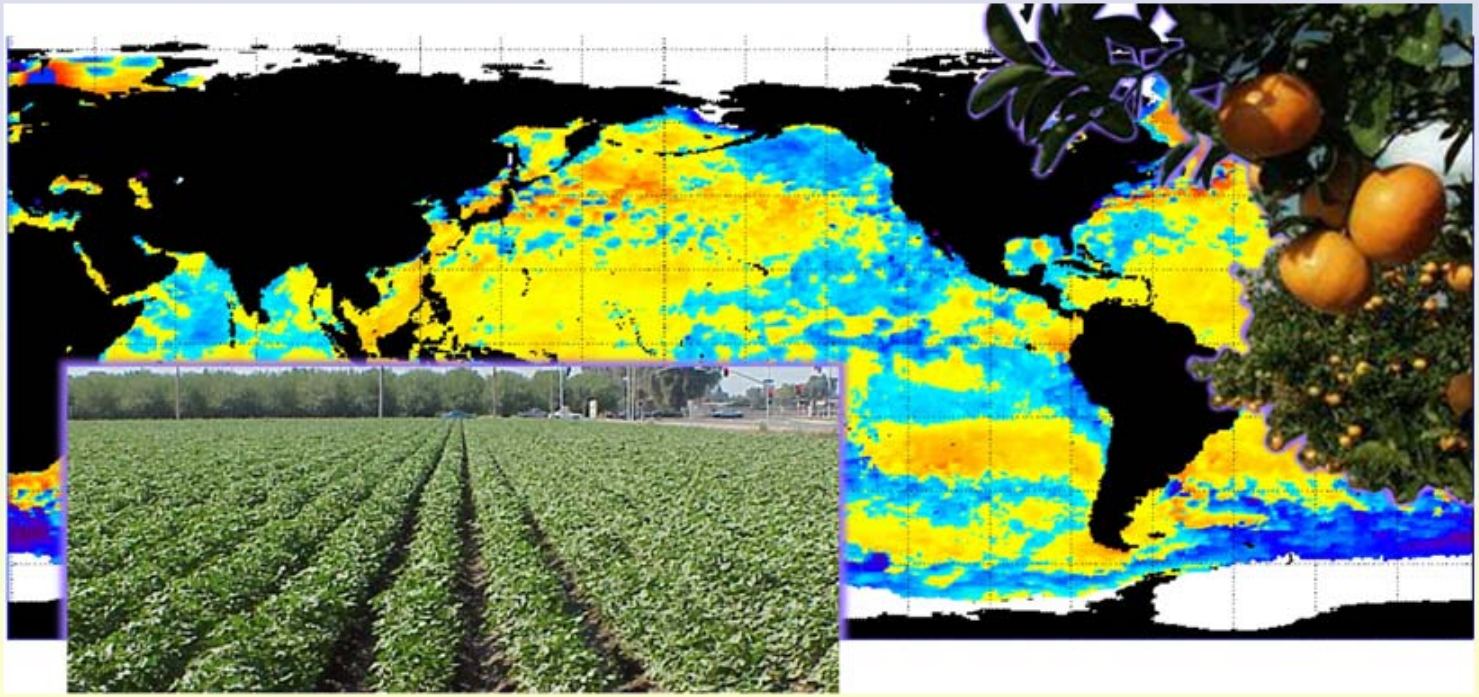
<www.flsart.org>.

[SLIDE 1]


STATE AGRICULTURAL RESPONSE TEAM
S.A.R.T.
FLORIDA

[SLIDE 2]

Using Climate Forecasts in Agriculture



[SLIDE 3]

Using Climate Forecasts in Agriculture

Prepared by:

Clyde Fraisse	Climate Extension Scientist, University of Florida, Gainesville
John Bellow	Climate Extension Scientist, Center for Ocean-Atmospheric Prediction Studies, Florida State University, Tallahassee
David Zierden	Assistant State Climatologist, Tallahassee
Carol Lehtola	Associate Professor, University of Florida, Gainesville
Susan Willams	University of Florida, Gainesville
Charles Brown	University of Florida, Gainesville

Sponsored by: USDA Risk Management Agency
Florida Department of Agriculture and Consumer Services

[SLIDE 4]

SECC Climate Consortium (SECC)

- **University of Florida**
  Institute of Food and Agricultural Sciences (IFAS)
- **Florida State University**
  Center for Ocean-Atmospheric Prediciton Sciences
- **University of Miami**
  Rosenstiel School of Marine and Atmospheric Science
- **University of Georgia**
  College of Agricultural and Environmental Sciences
- **Auburn University**
  Auburn University Environmental Institute
- **University of Alabama in Huntsville**
  Earth System Science Center

[SLIDE 5]

Objectives

- Climate and Weather – What's the difference?
- Can climate forecasts help agriculture and natural resources?
- El Niño and La Niña phases – What are they?
- Impacts of El Niño and La Niña on world climate and the southeast U.S. (Rain, temperature, freezes, hurricanes)
- Effect of El Niño and La Niña on agriculture in the southeast U.S. (Forest fires, crops)
- Introduction to the AgClimate Web site

[SLIDE 6]

Climate and Weather

What is the difference?

- **Climate** – Pattern of weather for a month or longer
  - Includes changes in average weather patterns due to global conditions such as ocean temperature
- **Weather** – Day-to-day changes in temperature and rain
  - Changes tied to weather systems such as cold and warm fronts and hurricanes

[SLIDE 7]

How do climate forecasts help Florida agriculture?

- Decide how to deal with the climate ahead of time
- Deciding ahead of time helps minimize risks to agriculture that may come with seasonal climate variability
- Examples: Climate forecasts can help producers choose which varieties to plant, how much crop insurance to buy, or what chemicals they will need.

[SLIDE 8]

El Niño and La Niña: What are they?

- Caused by changes in sea surface temperature (SST) in the equatorial Pacific Ocean
- Strongly influence climate around the world
- Return every 2 to 7 years but do not always follow each other
- Affect production of winter vegetables and other crops in the southeast U.S.

[SLIDE 9]

El Niño and La Niña Phases

- **El Niño Phase** – Warmer than normal sea surface temperature in the Pacific Ocean near the equator

  Example: Strong El Niño phases in 1982-83 and 1997-98 caused excessive rainfall on the West Coast and the Gulf coast

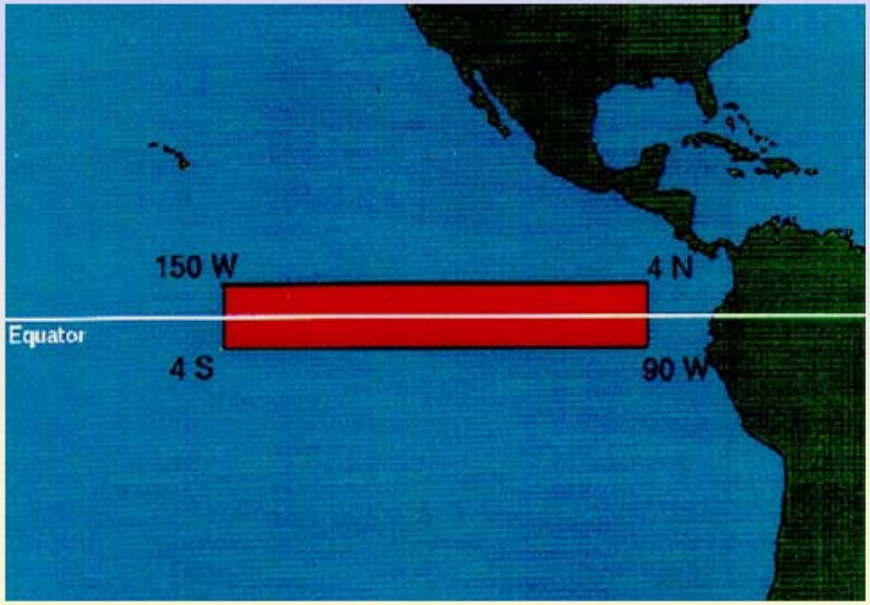
- **La Niña Phase** – Cooler than normal sea surface temperature in the Pacific Ocean near the equator

  Example: 1998-99 and 1999-2000 La Niña phases caused drier and warmer winters in Florida. *Result*: increase forest fires; drier and warmer than usual temperatures in other parts of the U.S.

[SLIDE 10]

Track El Niño and La Niña

Changes in water temperature in this red-shaded area of the Pacific Ocean on the equator near South America are monitored to track El Niño or La Niña phases



[SLIDE 11]

Neutral Years

- Neither El Niño nor La Niña phases exist
- Surface water temperatures (SSTs) normal or near normal; SSTs are different at different times of the year but are usually from 75˚F to 80˚F in December through February
- Neutral phases are twice as likely to happen as either El Niño and La Niña

[SLIDE 12]

El Niño and La Niña – Impact on SE US

- ✓ Rain
- ✓ Temperature
- ✓ Freezes
- ✓ Hurricanes
- ✓ Wild fires
- ✓ Crop production

[SLIDE 13]

El Niño and La Niña and Rain

- El Niño Phase – Increase in average rain November to March; 30% more rain than normal amount
  - Extra El Niño winter rain can lower harvest of winter vegetables due to excessive moisture and low solar radiation
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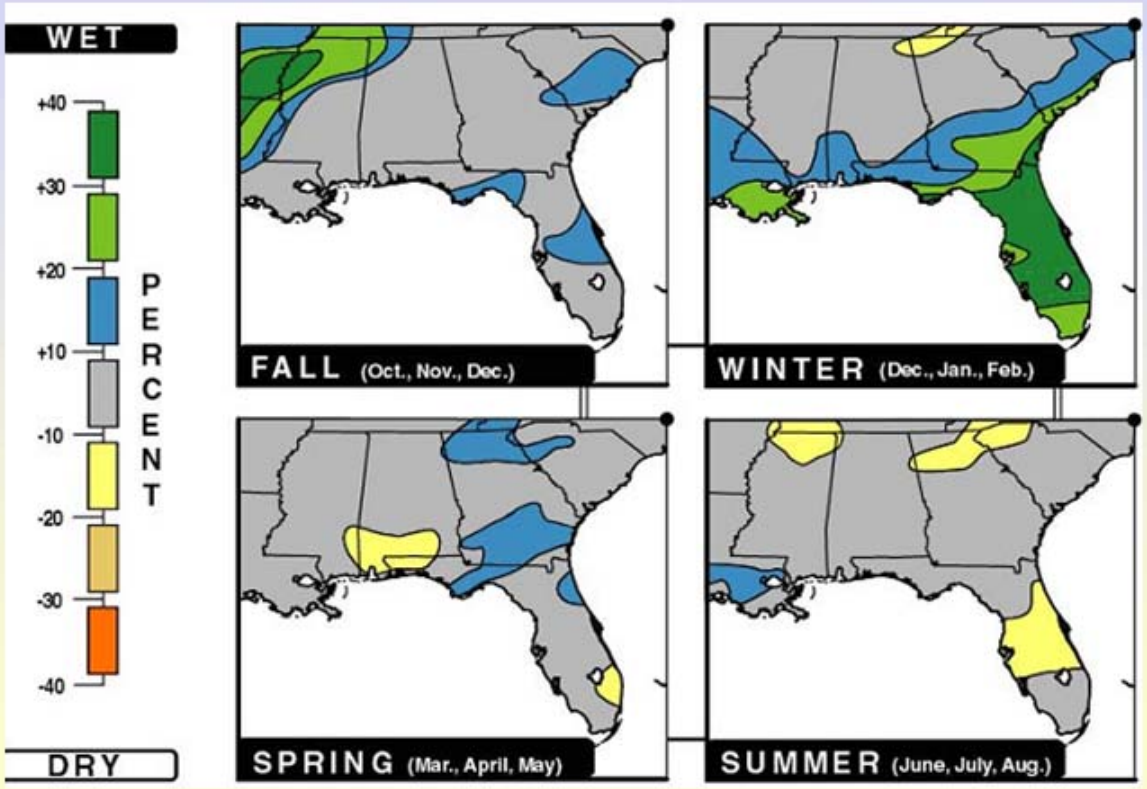
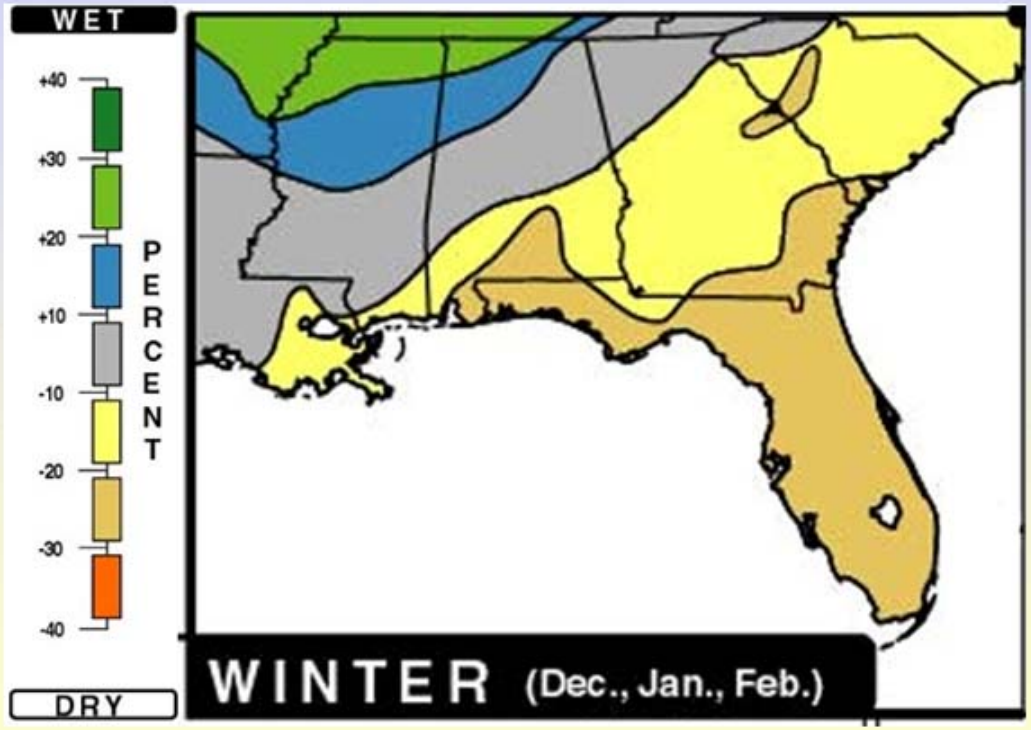
[SLIDE 14]

El Niño Rain Changes



[SLIDE 15]

La Niña Rain Changes



[SLIDE 16]

El Niño and La Niña and Temperature

- El Niño Phase – Temperature 2˚F to 3˚F below normal in Florida and Gulf Coast during the winter
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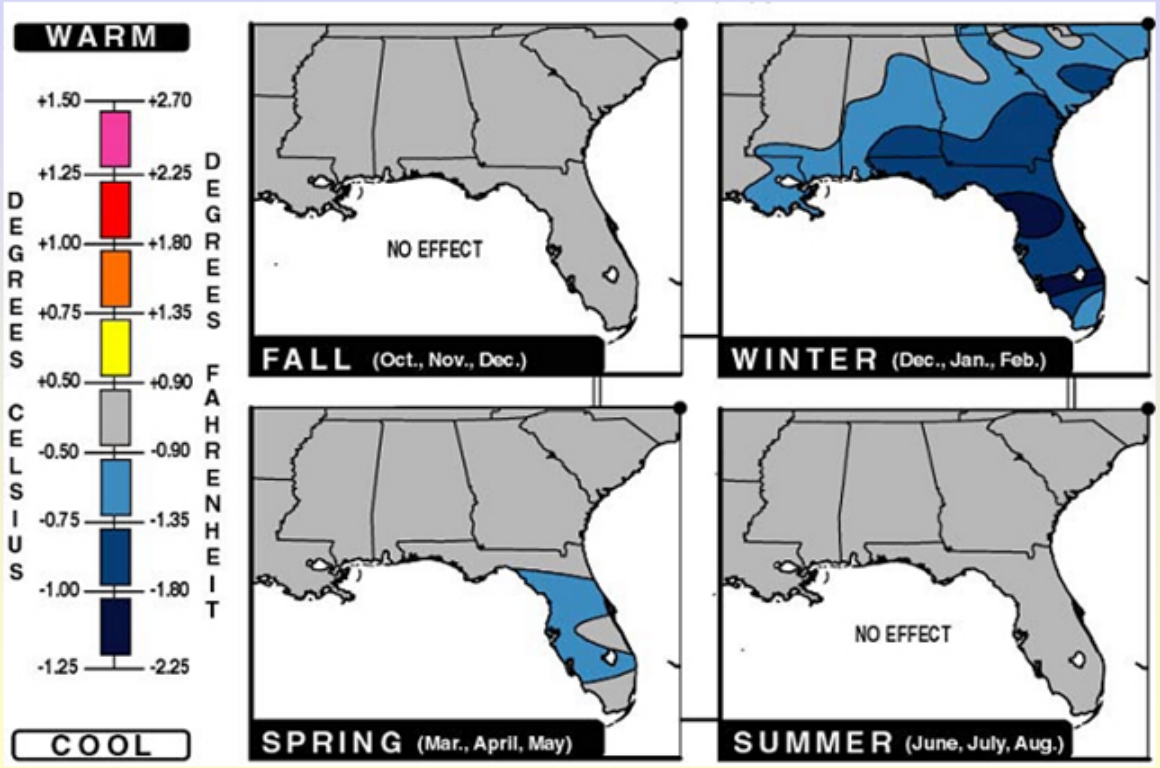
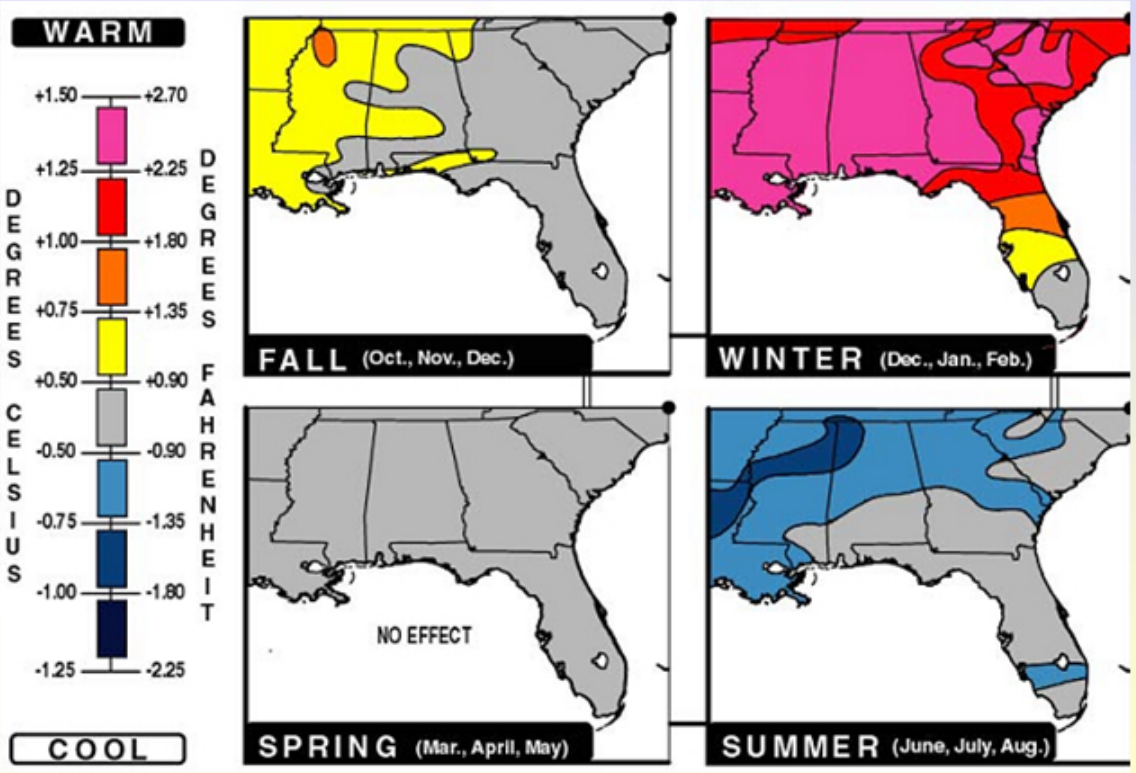
[SLIDE 17]

El Niño Temperature Changes



[SLIDE 18]

La Niña Temperature Changes



[SLIDE 19]

El Niño and La Niña and Freezes

- More likely to happen in Neutral phases
- 11 of the 12 freezes that seriously damaged southeast agriculture in the last 103 years occurred in Neutral phase winters
- El Niño and La Niña phases do not appear to affect when first and last frost happen

[SLIDE 20]

Freezes

Last 12 severe freezes in Central Florida were all during Neutral years

[SLIDE 21]

El Niño and La Niña and Hurricanes

- El Niño Phase – Fewer hurricanes because upper level winds over Atlantic Ocean are not suitable; chance of a hurricane striking the U.S. is less likely
- La Niña Phase – Helps hurricanes develop in the Atlantic Ocean; greater chance that a hurricane may hit the U.S.

[SLIDE 22]

Hurricanes

Chance of 2 hurricanes hitting the U.S.:

- 28% in El Niño
- 48% in Neutral
- 66% in La Niña

[SLIDE 23]

La Niña and Wild Fires

In La Niña Phase –

- Below normal rain from fall into April, one of driest months of the year
- Soil and forests extremely dry; Increased risk of fires in spring and summer, especially in South Florida

[SLIDE 24]

Wild Fires

- In El Niño Phase – Wet winters seem to lower the risk of wild fires
- Wild fires usually not a problem in western Panhandle -- this area gets more rain than rest of state

[SLIDE 25]

Weather Forecasts…

Help you decide when to

- Plant
- Spray
- Fertilize
- Irrigate

[SLIDE 26]

Climate Forecasts…

Help you decide about

- Crop varieties
- Acreage allocation
- Crop insurance
- Marketing strategy

[SLIDE 27]

Using Climate Forecasts

EXAMPLE:

During La Niña, central Florida strawberry growers plant varieties suitable for increased solar radiation

[SLIDE 28]

Using Climate Forecasts

EXAMPLE:

During El Niño, potato growers crown fields and maintain drainage

[SLIDE 29]

Climate Forecasts

EXAMPLES:

- Citrus growers irrigate to maintain soil moisture during La Niña winters
- Farmers decide on crop insurance and how much coverage to buy

[SLIDE 30]

Degree-days and Development

Developmental stages and Required Degree-Days for Cotton*

Developmental Stage	Heat Units or Degree-Days	Approx. Days
Planting	0	0
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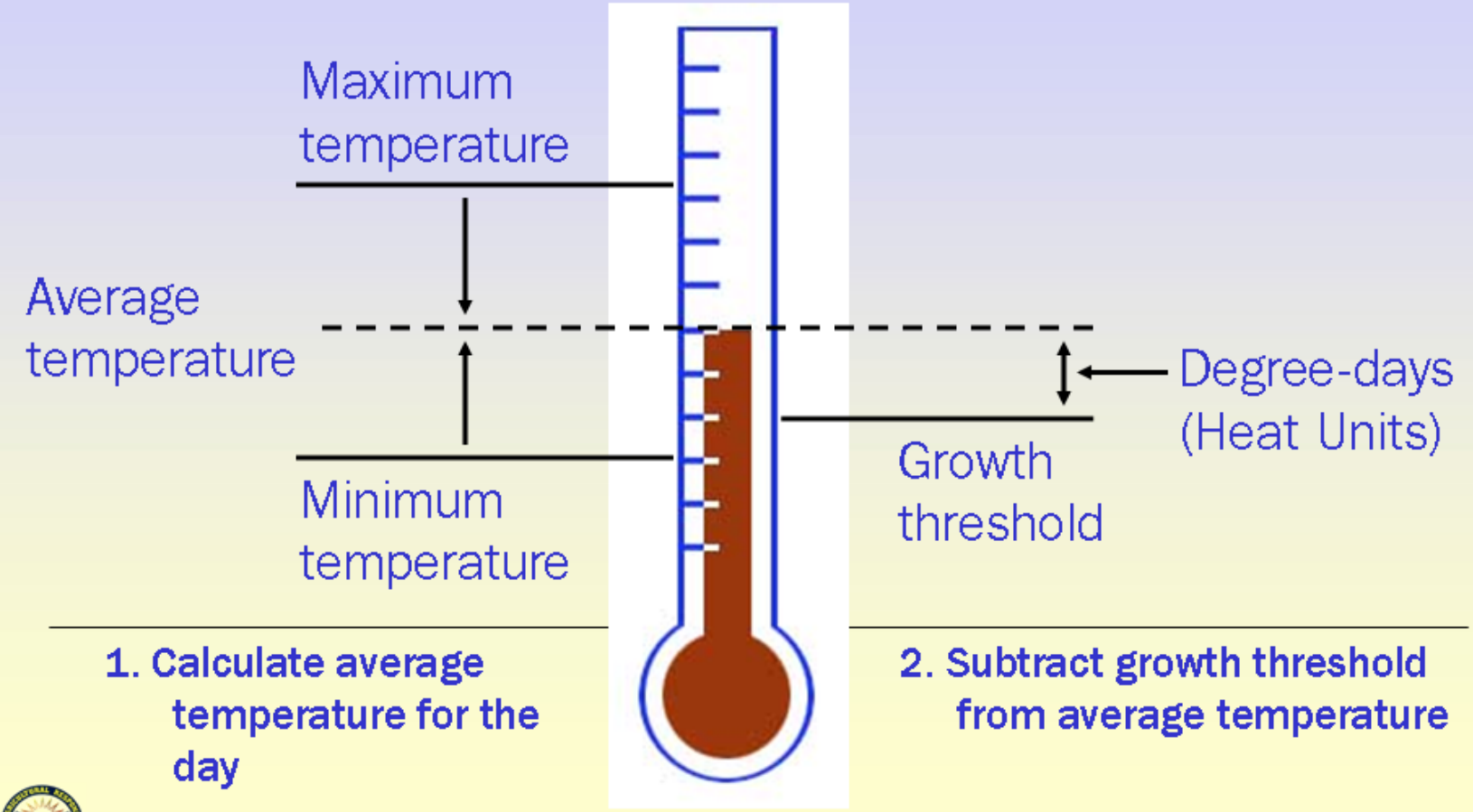
Add nodes to main stem	45-65 per node	3 days/node
First square	500	48
First bloom	850	68
Cutout	1300-1450	90-104
First open boll	1700	118
Harvest	2150-2300	148+

*Based on information from University of Missouri Extension

[SLIDE 31]

Calculating Degree-days



1. Calculate average temperature for the day

2. Subtract growth threshold from average temperature

[SLIDE 32]

Cumulative Degree-days

A Month						
			1 1.1	2 0.9	3 0.6	4 0.7
5 1.1	6 1.5	7 2.1	8 2.0	9 1.3	10 1.2	11 1.1
12 0.9	13 0.9	14 1.0	15 1.1	16 1.4	17 1.5	18 1.4
19 1.4	20 1.3	21 1.4	22 1.2	23 1.1	24 0.9	25 0.8
26 0.7	27 0.8	28 1.0	29 1.2	30 1.3	31 1.2	. .

Add all the degree-days (in red) for this sample month to find the total degree-days

Total degree-days

36.1

[SLIDE 33]

Heat Stress Degree-days

- Heat stress degree-days are calculated like degree-days
- Often used to determine the stress on livestock
- Remember to use the correct threshold – often around 75˚F

[SLIDE 34]

www.AgClimate.org

[SLIDE 35]

With AgClimate you can…

- Check climate forecast and expected conditions for your county
- Link to national and international climate forecast Web sites
- Learn about the influence of climate on crops, pasture and livestock
- Monitor forest fire risk levels
- Link to other Web sites for more information

[SLIDE 36]

AgClimate in the Future

Soon, AgClimate will also have decision aids to help you:

- Forecast growing degree days (GDD) and chilling units (CU)
- Analyze seasonal irrigation costs and amounts
- Analyze the impact of climate on historical yield patterns

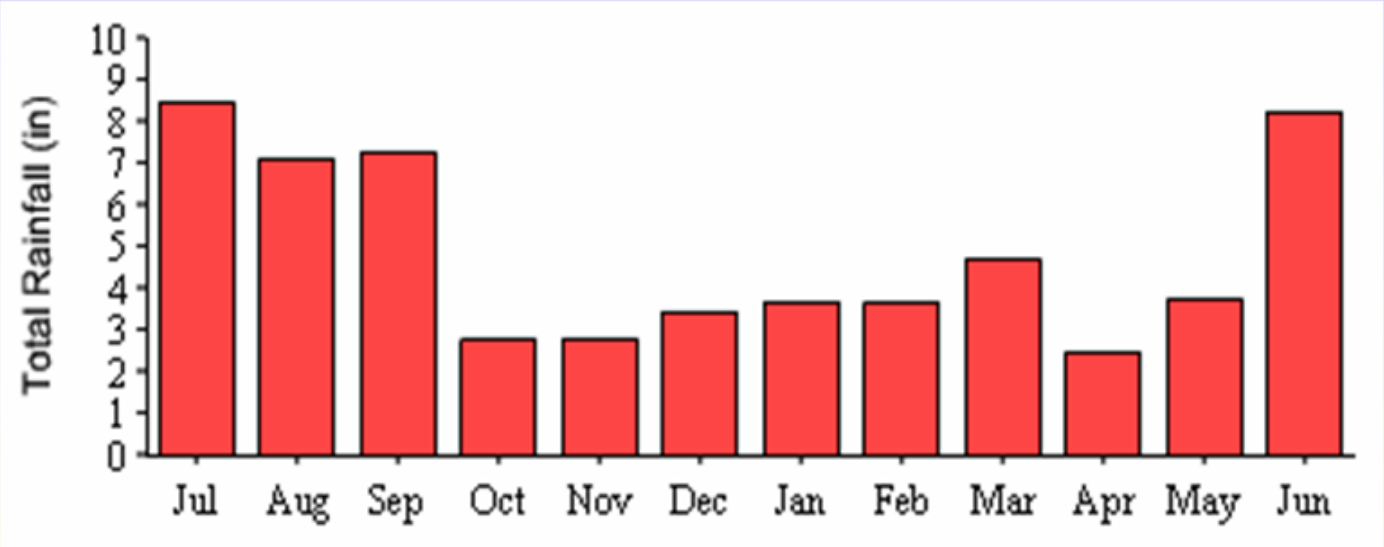
[SLIDE 37]

AgClimate Main Menu

- Climate and crop yield risk tools
- Climate forecasts
- Crop yield risk, management, links
- Forest fire risk, forestry management
- Pasture management
- Livestock management
- Climate information, links
- Web survey
- Who we are

[SLIDE 38]

AgClimate Tool – Climate Risk



Expected average monthly rainfall
during El Niño events in Polk County, Fla.

[SLIDE 39]

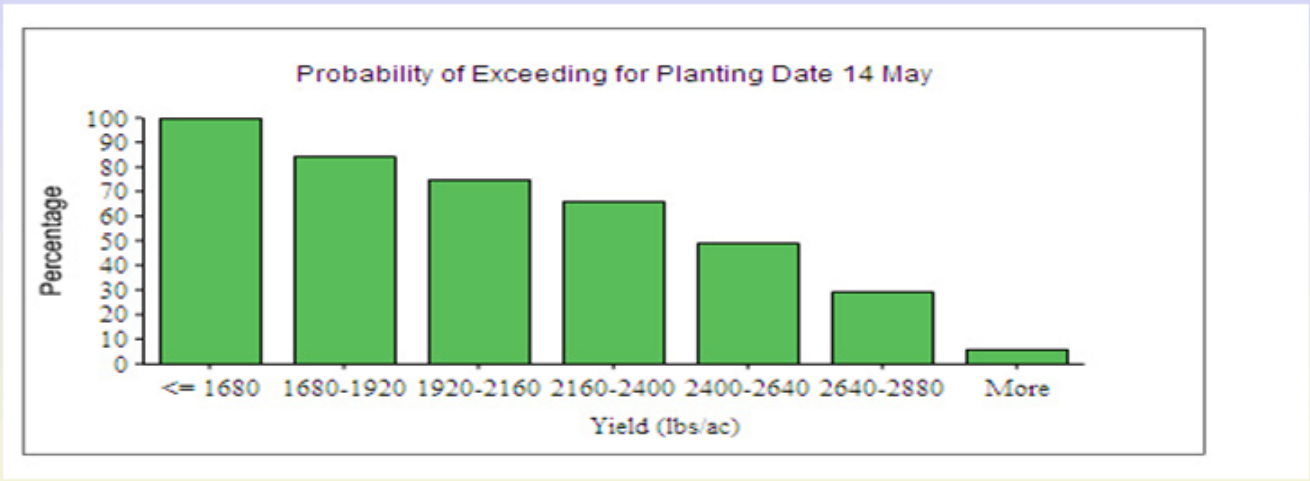
AgClimate Tool – Yield Risk

Figure out the yield risk for:

- Peanuts
- Potatoes
- Tomatoes

[SLIDE 40]

AgClimate Tools – Yield Risk Tool



Chances of increasing peanut harvest
Jackson County, FL during Neutral years

[SLIDE 41]

Summary 1

- Climate is a long-term pattern of weather.
- Climate is an important influence on agriculture.
- Patterns of warming in the equatorial Pacific have a strong effect on climate and weather in the southeast U.S.
- Degree-days are a useful way of measuring how much energy for growth is available.

[SLIDE 42]

Summary 2

- Degree-days can also be used to determine heat stress on livestock.
- The AgClimate Web site provides information and decision-making tools based on climate research.
- The AgClimate Web site can be found at:

<www.AgClimate.org>

[SLIDE 43]

Thank You !

PowerPoint Slides — Handout Pages

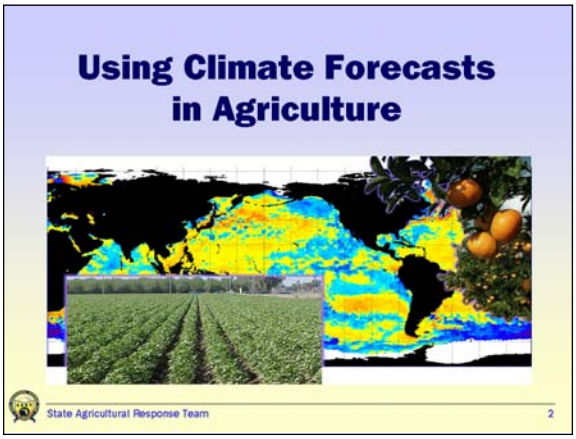
The "Using Climate Forecasts in Agriculture" PowerPoint slides are reproduced on the following pages at reduced size with space for participant notes.

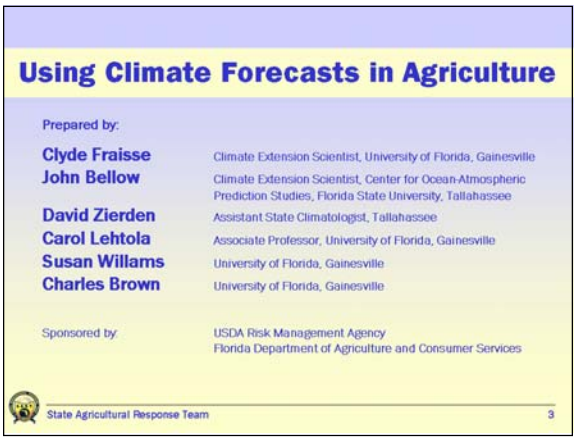
Also included in *Using Climate Forecasts in Agriculture* Workbook, available on the SART Web site:

<www.flsart.org>

Using Climate Forecasts in Agriculture

Slides 1-3





Slides 4-6

SECC Climate Consortium (SECC)

- University of Florida
  Institute of Food and Agricultural Sciences (IFAS)
- Florida State University
  Center for Ocean-Atmospheric Prediciton Sciences
- University of Miami
  Rosenstiel School of Marine and Atmospheric Science
- University of Georgia
  College of Agricultural and Environmental Sciences
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State Agricultural Response Team 4

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- El Niño and La Niña phases – What are they?
- Impacts of El Niño and La Niña on world climate and the southeast U.S. (Rain, temperature, freezes, hurricanes)
- Effect of El Niño and La Niña on agriculture in the southeast U.S. (Forest fires, crops)
- Introduction to the AgClimate Web site

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Climate and Weather

What is the difference?

- **Climate** – Pattern of weather for a month or longer
  – Includes changes in average weather patterns due to global conditions such as ocean temperature
- **Weather** – Day-to-day changes in temperature and rain
  – Changes tied to weather systems such as cold and warm fronts and hurricanes

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Slides 7-9

How do climate forecasts help Florida agriculture?

- Decide how to deal with the climate ahead of time
- Deciding ahead of time helps minimize risks to agriculture that may come with seasonal climate variability
- Examples: Climate forecasts can help producers choose which varieties to plant, how much crop insurance to buy, or what chemicals they will need.

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El Niño and La Niña: What are they?

- Caused by changes in sea surface temperature (SST) in the equatorial Pacific Ocean
- Strongly influence climate around the world
- Return every 2 to 7 years but do not always follow each other
- Affect production of winter vegetables and other crops in the southeast U.S.

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El Niño and La Niña Phases

- El Niño Phase – Warmer than normal sea surface temperature in the Pacific Ocean near the equator

  Example: Strong El Niño phases in 1982-83 and 1997-98 caused excessive rainfall on the West Coast and the Gulf coast
- La Niña Phase – Cooler than normal sea surface temperature in the Pacific Ocean near the equator

  Example: 1998-99 and 1999-2000 La Niña phases caused drier and warmer winters in Florida. *Result:* increase forest fires; drier and warmer than usual temperatures in other parts of the U.S.

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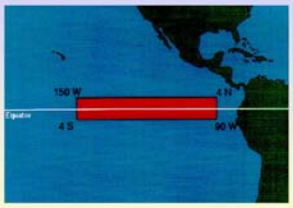
Slides 10-12

Track El Niño and La Niña

Changes in water temperature in this red-shaded area of the Pacific Ocean on the equator near South America are monitored to track El Niño or La Niña phases



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Neutral Years

- Neither El Niño nor La Niña phases exist
- Surface water temperatures (SSTs) normal or near normal; SSTs are different at different times of the year but are usually from 75˚F to 80˚F in December through February
- Neutral phases are twice as likely to happen as either El Niño and La Niña

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El Niño and La Niña – Impact on SE US

- ✓ Rain
- ✓ Temperature
- ✓ Freezes
- ✓ Hurricanes
- ✓ Wild fires
- ✓ Crop production

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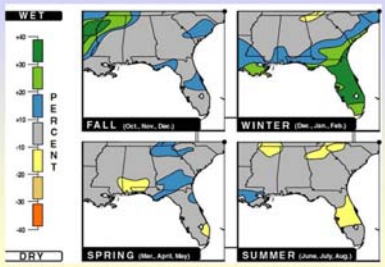
Slides 13-15

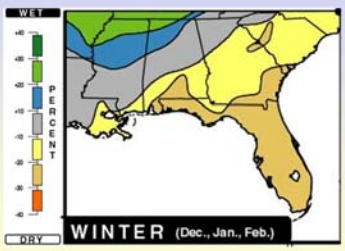
El Niño and La Niña and Rain

- El Niño Phase – Increase in average rain November to March; 30% more rain than normal amount
  - Extra El Niño winter rain can lower harvest of winter vegetables due to excessive moisture and low solar radiation
- La Niña Phase – Less than average rain November to March; 10% to 30% less than normal amount lasting from fall through winter and spring

El Niño Rain Changes



La Niña Rain Changes



Slides 16-18

El Niño and La Niña and Temperature

- El Niño Phase – Temperature 2˚F to 3˚F below normal in Florida and Gulf Coast during the winter
- La Niña Phase – Temperatures 2˚F to 4˚F above normal December through April and increase farther north in Florida
  - La Niña phase average daily minimum temperatures June through August likely to be lower than normal in south Florida

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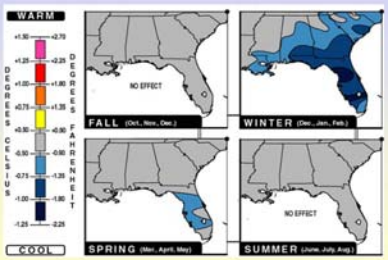
El Niño Temperature Changes



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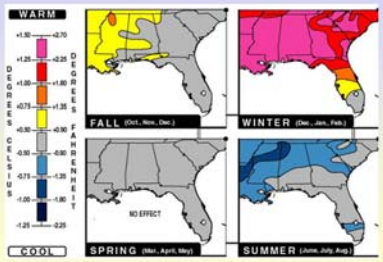
La Niña Temperature Changes



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Slides 19-21

El Niño and La Niña and Freezes

- More likely to happen in Neutral phases
- 11 of the 12 freezes that seriously damaged southeast agriculture in the last 103 years occurred in Neutral phase winters
- El Niño and La Niña phases do not appear to affect when first and last frost happen

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Freezes

Last 12 severe freezes in Central Florida were all during Neutral years

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El Niño and La Niña and Hurricanes

- El Niño Phase – Fewer hurricanes because upper level winds over Atlantic Ocean are not suitable; chance of a hurricane striking the U.S. is less likely
- La Niña Phase – Helps hurricanes develop in the Atlantic Ocean; greater chance that a hurricane may hit the U.S.

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Slides 22-24

Hurricanes

Chance of 2 hurricanes hitting the U.S.:

- 28% in El Niño
- 48% in Neutral
- 66% in La Niña

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La Niña and Wild Fires

In La Niña Phase –

- Below normal rain from fall into April, one of driest months of the year
- Soil and forests extremely dry; Increased risk of fires in spring and summer, especially in South Florida

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Wild Fires

- In El Niño Phase – Wet winters seem to lower the risk of wild fires
- Wild fires usually not a problem in western Panhandle – this area gets more rain than rest of state

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Slides 25-27

Weather Forecasts...

Help you decide when to

- Plant
- Spray
- Fertilize
- Irrigate

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Climate Forecasts...

Help you decide about

- Crop varieties
- Acreage allocation
- Crop insurance
- Marketing strategy

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Using Climate Forecasts

EXAMPLE:

During La Niña, central Florida strawberry growers plant varieties suitable for increased solar radiation

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Slides 28-30

Using Climate Forecasts

EXAMPLE:

During El Niño, potato growers crown fields and maintain drainage

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Climate Forecasts

EXAMPLES:

- Citrus growers irrigate to maintain soil moisture during La Niña winters
- Farmers decide on crop insurance and how much coverage to buy

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Degree-days and Development

Developmental stages and Required Degree-Days for Cotton*

Developmental Stage	Heat Units or Degree-Days	Approx. Days
Planting	0	0
Seedling emergence	55	12
Add nodes to main stem	45-65 per node	3 days/node
First square	500	48
First bloom	850	68
Cutout	1300-1450	90-104
First open boll	1700	118
Harvest	2150-2300	148+

*Based on information from University of Missouri Extension

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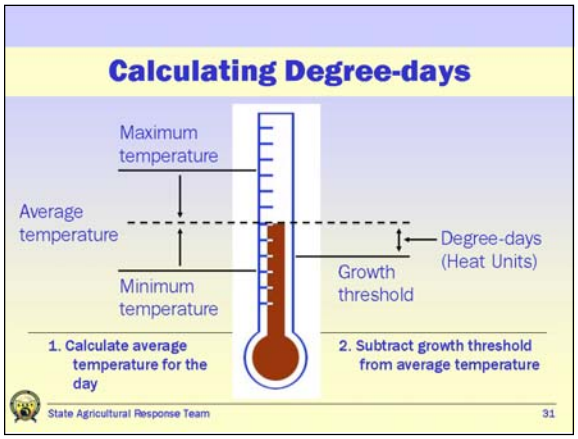
Slides 31-33


Calculating Degree-days
Maximum temperature
Average temperature
Minimum temperature
Degree-days (Heat Units)
Growth threshold
1. Calculate average temperature for the day
2. Subtract growth threshold from average temperature
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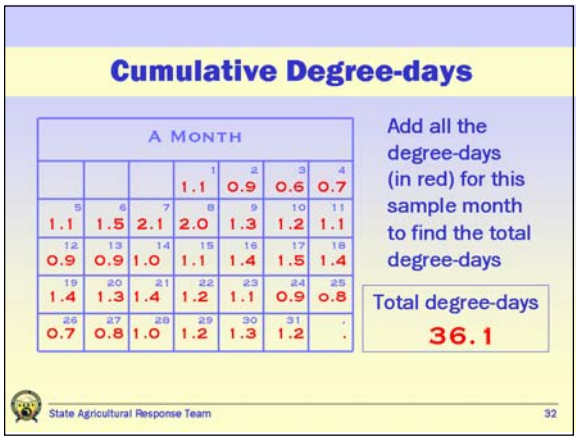
Cumulative Degree-days
A Month
1 1.1
2 0.9
3 0.6
4 0.7
5 1.1
6 1.5
7 2.1
8 2.0
9 1.3
10 1.2
11 1.1
12 0.9
13 0.9
14 1.0
15 1.1
16 1.4
17 1.5
18 1.4
19 1.4
20 1.3
21 1.4
22 1.2
23 1.1
24 0.9
25 0.8
26 0.7
27 0.8
28 1.0
29 1.2
30 1.3
31 1.2
Add all the degree-days (in red) for this sample month to find the total degree-days
Total degree-days
36.1
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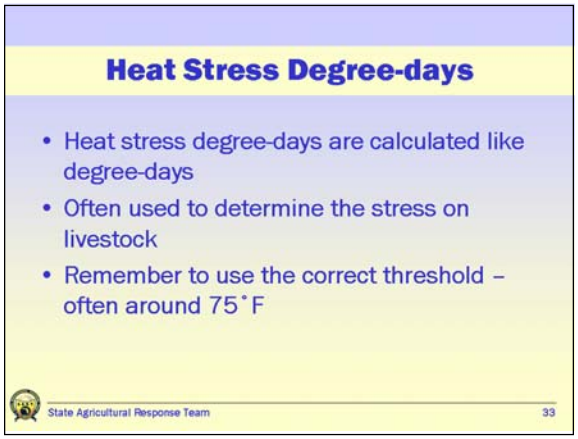
Heat Stress Degree-days
• Heat stress degree-days are calculated like degree-days
• Often used to determine the stress on livestock
• Remember to use the correct threshold – often around 75˚F
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Slides 34-36

www.AgClimate.org

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With AgClimate you can...

- Check climate forecast and expected conditions for your county
- Link to national and international climate forecast Web sites
- Learn about the influence of climate on crops, pasture and livestock
- Monitor forest fire risk levels
- Link to other Web sites for more information

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AgClimate in the Future

Soon, AgClimate will also have decision aids to help you:

- Forecast growing degree days (GDD) and chilling units (CU)
- Analyze seasonal irrigation costs and amounts
- Analyze the impact of climate on historical yield patterns

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Slides 37-39

AgClimate Main Menu

AgClimate Tools
Forecasts
Crops
Forestry
Pasture
Livestock
Climate & El Niño
Your Feedback
About

- Climate and crop yield risk tools
- Climate forecasts
- Crop yield risk, management, links
- Forest fire risk, forestry management
- Pasture management
- Livestock management
- Climate information, links
- Web survey
- Who we are

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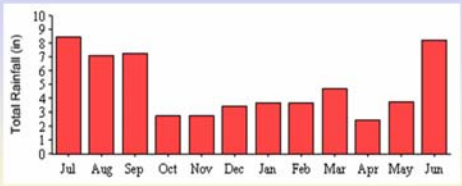
AgClimate Tool – Climate Risk



Expected average monthly rainfall during El Niño events in Polk County, Fla.

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AgClimate Tool – Yield Risk

Figure out the yield risk for:

- Peanuts
- Potatoes
- Tomatoes

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Slides 40-42

AgClimate Tools – Yield Risk Tool

Chances of increasing peanut harvest
Jackson County, FL during Neutral years

Summary 1

- Climate is a long-term pattern of weather.
- Climate is an important influence on agriculture.
- Patterns of warming in the equatorial Pacific have a strong effect on climate and weather in the southeast U.S.
- Degree-days are a useful way of measuring how much energy for growth is available.

Summary 2

- Degree-days can also be used to determine heat stress on livestock.
- The AgClimate Web site provides information and decision-making tools based on climate research.
- The AgClimate Web site can be found at:
  <www.AgClimate.org>

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