



Understanding Frost Probabilities

Deciduous tree fruit growers and vegetable gardeners are usually interested in when the last spring freeze may occur. Fruit growers want to know how likely it may be for a freeze to occur that will damage or kill developing fruit crops following bloom. Vegetable gardeners want to know when it will be safe for them to plant warm season crops such as tomatoes, green beans, and squash without using frost protection.

The critical temperature for developing deciduous tree fruits is usually about 28 degrees F. There are a few frost protection methods that can partially protect developing fruit from freezing and subsequent losses, but the best strategy is to plant later blooming fruit varieties that are known to successfully produce fruit in your neighborhood. The protection strategies range from wind machines (too expensive for home gardeners) to covering plants with frost cloth or sheets and having an incandescent light bulb to heat the trapped air under the fabric.

Freezing temperatures (32 degrees F and below) are critical temperatures for warm season vegetables. However, it is also important for the soil to be warm enough for germinating seeds and active root growth. Ohio State University Extension recommends that warm season crops only be planted after soil temperatures reach 55 to 60 degrees F. Local Verde Valley folk wisdom says to plant warm season crops only after the native mesquite trees have leafed out in your area. This is actually pretty reliable because it integrates air and soil temperatures.

Many vegetable gardeners will gamble with the likelihood of frost. They may use season extension techniques such as floating row cover, low tunnels or “walls of water”. Those gambling without using season extension techniques often need to replace transplants or wait for weeks for seed germination. You may find that waiting and planting after June 1 allows the plants to grow/germinate rapidly and they will often outgrow the plants that were planted earlier using a season extender.

The best way to gamble with critical temperatures is to be aware of local climate records and use them in decision making. Fortunately, the Region Climate Centers have compiled local climate data and have on-line information available to inform local growers of historic temperature trends that help make better informed decisions.

Arizona has 375 weather stations where the historic data has been gathered and analyzed. Precipitation and temperature records are available along with many tools which include fall and spring freeze probabilities.

The Arizona weather station data can be accessed at: <https://wrcc.dri.edu/summary/Climsmaz.html>. At this site, you will see a map and a navigation bar on the left side of the screen. The little red squares on the map are weather station locations and you may click directly on these for that station’s data. Similarly, the stations are listed by name on the navigation bar.

Once you’ve found the station you are interested in, you will see a table with temperature and precipitation data. You will also see the period of record which is not the same for all stations listed. Again, there is a navigation bar on the left. Scroll down through the information and under the word “Temperature” you will see spring and fall frost probabilities. Click on one of these and you will see a graph with data for multiple temperatures. Below the graph is another link called “Tabular Output”. This is a useful data format.

Here you will see probabilities across the tops of the columns and temperatures at the head of each row. To interpret the data, select a temperature and look across the row to see how the freeze probabilities change with date. For example, in the following chart for Prescott, there is a 50% chance it will freeze (32°F) on or after May 12 a 10% chance it will freeze on or after Jun 1. The latest freeze date in the period of record is June 17.

Prescott – Spring Freeze Probabilities (32°) – 1922 to 2022										
Earliest	90%	80%	70%	60%	50%	40%	30%	20%	10%	Latest
Apr 11	Apr 24	Apr 30	May 5	May 9	May 12	May 18	May 21	May 26	Jun 1	Jun 17

Prescott – Fall Freeze Probabilities (32°) – 1922 to 2022										
Earliest	10%	20%	30%	40%	50%	60%	70%	80%	90%	Latest
Aug 23	Sep 23	Oct 1	Oct 6	Oct 9	Oct 13	Oct 16	Oct 20	Oct 25	Nov 1	Nov 15

Additional Resources

[Arizona Weather Station Data](#)
Western Regional Climate Center

[Season Extension: Introduction and Basic Principles](#)
North Carolina State University Extension

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