

NOAA Product Highlight: Frost/Freeze Data

Climate plays an important role in agriculture, commerce, industry, transportation, and our everyday lives. Freezing temperatures and frost occurrence often adversely affect all of these areas of society, especially operations with principal activities outdoors. One of the most significant hazards of frost/freeze conditions is in the agricultural industry, where late spring freezes, early fall freezes, and short growing seasons can seriously impact plant production and crop volume. Scientists are seeing a shift in frost/freeze dates and in growing season durations as the climate changes. These changes put plants at an increased risk of experiencing late season frost/freeze events, which has prompted the agriculture industry to change crop varieties to adapt.

Examining historical climate records can help decision makers determine when to plant crops and what varieties to plant. In 2012, NOAA released a supplement to the 1981–2010 Climate Normals that includes frost/freeze date probabilities, probabilities of frost/freeze occurrence, and growing season length Normals.

Climate Normals are the average values of meteorological elements, including temperature and precipitation, over 30 years. Frost/freeze date probabilities and growing season length Normals are based on the first and last “killing freeze” of the growing season. A killing freeze is, essentially, a cold snap that hinders plant growth, and this temperature threshold varies from one plant species to another. Therefore, we use the term “frost/freeze” to indicate cold weather impacts across various temperature thresholds between 16°F and 36°F.

Frost/freeze probability dates represent the likelihood that a location will experience a given minimum temperature before or after a given date. NOAA scientists calculate probabilities at the 10, 20, 30, 40, 50, 60, 70, 80, and 90 percent levels. Frost/freeze probabilities of occurrence are the likelihood that a location will experience a given minimum temperature at least once during a month or year. Growing season length Normals are the likelihood that the growing season (the number of days between the last spring frost/freeze and the first autumn frost/freeze) will be at least the specified number of days.

Users can access supplemental Normals, such as the frost/freeze Normals, under “Annual Climate Normals” in the [Climate Data Online](#) system.

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information
Service

**Summary of Annual Normals
1981-2010**

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801
www.ncdc.noaa.gov

Station: WEST CHESTER, PA US

GHCND:USC00369464
Elev: 114 ft. Lat: 39.971° N Lon: 75.635° W

Freeze Data										
Spring Freeze Dates (Month/Day)										
Temp (F)	Probability of later date in spring (through Jul 31) than indicated(*)									
	.10	.20	.30	.40	.50	.60	.70	.80	.90	
36	5/22	5/18	5/14	5/10	5/08	5/04	5/01	4/29	4/24	
32	5/12	5/09	5/02	4/29	4/27	4/23	4/20	4/17	4/11	
28	4/29	4/23	4/19	4/15	4/12	4/09	4/08	4/03	3/30	
24	4/15	4/10	4/05	4/03	4/01	3/30	3/25	3/22	3/16	
20	4/06	4/01	3/28	3/24	3/21	3/18	3/15	3/11	3/07	
16	3/29	3/22	3/18	3/14	3/11	3/08	3/04	3/01	2/24	
Fall Freeze Dates (Month/Day)										
Temp (F)	Probability of earlier date in fall (beginning Aug 1) than indicated(*)									
	.10	.20	.30	.40	.50	.60	.70	.80	.90	
36	9/24	9/28	10/01	10/02	10/04	10/06	10/09	10/12	10/17	
32	10/01	10/05	10/08	10/11	10/14	10/17	10/20	10/25	10/31	
28	10/10	10/15	10/19	10/23	10/26	10/29	11/01	11/05	11/10	
24	10/22	10/28	11/01	11/03	11/06	11/10	11/13	11/17	11/23	
20	11/02	11/08	11/12	11/15	11/19	11/22	11/26	12/01	12/07	
16	11/14	11/20	11/25	11/30	12/02	12/06	12/10	12/16	12/21	
Freeze Free Period										
Temp (F)	Probability of longer than indicated freeze free period (Days)									
	.10	.20	.30	.40	.50	.60	.70	.80	.90	
36	167	161	156	152	148	145	141	136	131	
32	191	184	179	174	170	166	161	156	150	
28	216	209	204	199	195	191	186	181	173	
24	240	233	227	223	219	215	210	205	198	
20	264	256	251	246	242	237	232	227	220	
16	288	280	275	269	265	260	255	249	241	

* Probability of observing a temperature as cold, or colder, later in the spring or earlier in the fall than the indicated date
0.00 indicates that the probability of occurrence of threshold temperature is less than the indicated probability.
Derived from 1981-2010 serially complete daily data

Complete Documentation available from:
www.ncdc.noaa.gov/oa/climate/normal/usnormals.html