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

Climatography of the United States No. 20 1971-2000

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

Station: CASTANA EXPERIMENT FARM, IA **COOP ID: 131277**

Climate Division: IA 4 **NWS Call Sign:** **Elevation: 1,450 Feet** **Lat: 42˚04N** **Lon: 95˚50W**

Temperature (˚F)

	Mean (1)			Extremes										Degree Days (1) Base Temp 65		Mean Number of Days (3)					
Month	Daily Max	Daily Min	Mean	Highest Daily(2)	Year	Day	Highest Month(1) Mean	Year	Lowest Daily(2)	Year	Day	Lowest Month(1) Mean	Year	Heating	Cooling	Max >= 100	Max >= 90	Max >= 50	Max <= 32	Min <= 32	Min <= 0
Jan	29.5	11.0	20.3	65	1981	24	32.6	1990	-27	1970	21	6.7	1979	1387	0	.0	.0	1.7	17.0	30.1	8.4
Feb	35.9	17.5	26.7	71	1999	10	36.2	1987	-26	1996	2	12.3	1979	1072	0	.0	.0	5.4	11.9	25.9	4.0
Mar	48.3	27.9	38.1	87	1986	29	44.9	2000	-23	1960	5	29.5	1975	834	0	.0	.0	14.2	4.1	21.7	.8
Apr	62.3	39.5	50.9	94	1980	22	57.8	1981	4	1975	3	43.7	1983	430	6	.0	.2	25.1	.3	8.3	.0
May	73.1	50.9	62.0	101	1967	25	68.0	1988	24+	1967	2	57.5	1997	158	65	.0	.5	30.9	.0	.6	.0
Jun	82.2	60.4	71.3	104	1988	21	77.0	1988	38+	1956	1	66.4	1982	16	206	.2	4.1	30.0	.0	.0	.0
Jul	85.4	65.0	75.2	104	1955	31	80.2	1974	44	1971	30	69.7	1992	1	317	.2	7.5	31.0	.0	.0	.0
Aug	83.4	63.0	73.2	102	1988	17	80.2	1983	38	1986	28	67.9	1992	15	268	.2	5.6	31.0	.0	.0	.0
Sep	76.2	53.8	65.0	101	2000	2	70.8	1998	24	1984	29	59.5	1993	88	89	.1	1.9	29.9	.0	.6	.0
Oct	64.5	41.7	53.1	92	1963	5	57.9	1973	12	1972	19	48.0	1976	372	4	.0	@	27.9	.1	6.7	.0
Nov	45.6	27.8	36.7	79	1999	8	47.8	1999	-9+	1959	14	26.9	1985	850	0	.0	.0	12.1	4.8	20.7	.4
Dec	32.5	15.6	24.1	68	1998	1	31.4	1979	-26	1989	22	6.8	1983	1269	0	.0	.0	2.3	14.3	29.7	4.7
Ann	59.9	39.5	49.7	104+	Jun 1988	21	80.2+	Aug 1983	-27	Jan 1970	21	6.7	Jan 1979	6492	955	.7	19.8	241.5	52.5	144.3	18.3

\+ Also occurred on an earlier date(s)

@ Denotes mean number of days greater than 0 but less than .05

Complete documentation available from: www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

(1) From the 1971-2000 Monthly Normals

(2) Derived from station's available digital record: 1948-2001

(3) Derived from 1971-2000 serially complete daily data

Issue Date: February 2004

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Precipitation (inches)

Precipitation Totals

Month	Means/Medians(1) Mean	Means/Medians(1) Median	Extremes Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year
Jan	.60	.50	1.16	1949	3	1.85	1975	.00	1986
Feb	.57	.47	1.64	1954	20	2.48	1971	.08+	1996
Mar	2.14	1.96	2.28	1987	23	5.47	1987	.00	1994
Apr	3.29	2.87	3.80	1986	27	9.00	1986	.81	1989
May	4.18	4.20	2.90	1984	18	9.51	1982	1.39	1994
Jun	4.31	4.21	3.63	1984	16	9.96	1998	.34	1976
Jul	4.11	4.09	12.02	1996	17	12.75	1996	.43	1976
Aug	3.61	3.05	3.85	1996	5	8.46	1974	.30	1976
Sep	3.23	3.31	5.41	1978	13	8.40	1978	.25	2000
Oct	2.40	2.18	3.71	1970	9	6.51	1984	.04	1988
Nov	1.55	1.37	2.15	1991	30	4.11	1983	.01	1976
Dec	.81	.68	1.37	1959	27	3.21	1984	.00	1998
Ann	30.80	31.73	12.02	Jul 1996	17	12.75	Jul 1996	.00+	Dec 1998

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.5	2.0	.2	.0
Feb	4.5	1.8	.1	.0
Mar	7.0	4.4	1.4	.5
Apr	9.2	6.1	2.3	.7
May	10.7	7.4	2.9	1.1
Jun	10.1	6.8	2.8	1.2
Jul	8.3	5.8	2.5	1.0
Aug	8.2	5.4	2.2	1.0
Sep	7.4	5.4	2.3	.8
Oct	6.2	4.0	1.6	.6
Nov	5.3	3.3	1.0	.4
Dec	5.1	2.0	.4	.1
Ann	86.5	54.4	19.7	7.4

Precipitation Probabilities (1)

Probability that the monthly/annual precipitation will be equal to or less than the indicated amount

Monthly/Annual Precipitation vs Probability Levels
These values were determined from the incomplete gamma distribution

Month	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	.02	.07	.16	.25	.34	.45	.58	.74	.95	1.32	1.68
Feb	.09	.14	.22	.30	.38	.47	.57	.69	.86	1.12	1.38
Mar	.10	.28	.60	.91	1.25	1.63	2.07	2.63	3.40	4.67	5.92
Apr	.74	1.04	1.52	1.96	2.39	2.85	3.37	3.99	4.81	6.10	7.33
May	1.44	1.84	2.41	2.90	3.37	3.84	4.37	4.98	5.76	6.96	8.08
Jun	.85	1.24	1.87	2.45	3.04	3.67	4.38	5.25	6.39	8.22	9.96
Jul	.55	.89	1.47	2.04	2.65	3.31	4.08	5.02	6.30	8.39	10.41
Aug	.60	.92	1.44	1.94	2.45	3.00	3.63	4.40	5.43	7.09	8.68
Sep	.62	.91	1.39	1.82	2.27	2.74	3.29	3.94	4.80	6.19	7.51
Oct	.23	.40	.73	1.06	1.42	1.83	2.32	2.92	3.75	5.13	6.48
Nov	.14	.24	.45	.67	.90	1.17	1.49	1.89	2.44	3.36	4.26
Dec	.06	.15	.28	.40	.52	.66	.81	1.00	1.26	1.67	2.07
Ann	17.96	20.26	23.30	25.68	27.84	29.97	32.20	34.71	37.80	42.39	46.43

\+ Also occurred on an earlier date(s)
\# Denotes amounts of a trace
@ Denotes mean number of days greater than 0 but less than .05
****** Statistics not computed because less than six years out of thirty had measurable precipitation

(1) From the 1971-2000 Monthly Normals
(2) Derived from station's available digital record: 1948-2001
(3) Derived from 1971-2000 serially complete daily data

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Snow (inches)

Snow Totals

Means/Medians (1)

Extremes (2)

Mean Number of Days (1)

Snow Fall >= Thresholds

Snow Depth >= Thresholds

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year	0.1	1.0	3.0	5.0	10.0	1	3	5	10
Jan	6.6	4.5	3	2	10.0	1972	23	23.0	1975	25	1979	31	16	1979	4.9	2.9	.7	.2	.0	-9.9	-9.9	-9.9	-9.9
Feb	5.7	5.0	3	1	8.0	1971	22	13.9	1978	25	1979	18	23	1979	4.2	2.6	.6	.2	.0	8.3	3.5	.8	.0
Mar	4.9	4.5	1	#	10.0	1983	26	20.8	1983	26	1979	4	10	1979	2.6	1.3	.3	.1	.0	2.2	.1	.0	.0
Apr	1.8	.0	#	0	7.0	1992	21	12.0	1983	14	1997	12	1	1997	.7	.6	.2	.1	.0	.4	.2	.1	.0
May	.0	.0	0	0	.4	1989	5	.4	1989	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jun	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jul	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.8	.0	#	0	5.2	1981	24	5.2	1981	4	1991	31	#+	1997	@	@	.0	.0	.0	.0	.0	.0	.0
Nov	4.7	4.3	1	#	7.0	1983	27	18.5	1983	11	1983	28	4	1991	1.8	1.2	.3	.2	.0	1.9	.6	.1	.0
Dec	7.9	8.0	2	1	8.5	1984	14	20.1	1985	18	1983	30	13	1983	4.3	2.4	.7	.3	@	6.5	2.2	.9	.0
Ann	32.4	26.3	N/A	N/A	10.0+	Mar 1983	26	23.0	Jan 1975	26	Mar 1979	4	23	Feb 1979	18.5	11.0	2.8	1.1	@	-9.9	-9.9	-9.9	-9.9

+ Also occurred on an earlier date(s) #Denotes trace amounts

@ Denotes mean number of days greater than 0 but less than .05

-9/-9.9 represents missing values
Annual statistics for Mean/Median snow depths are not appropriate

(1) Derived from Snow Climatology and 1971-2000 daily data

(2) Derived from 1971-2000 daily data

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Freeze Data

Spring Freeze Dates (Month/Day)

Temp (F)	Probability of later date in spring (thru Jul 31) than indicated(*)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	5/16	5/12	5/09	5/06	5/03	5/01	4/28	4/24	4/20
32	5/12	5/07	5/03	4/30	4/27	4/24	4/20	4/17	4/11
28	4/29	4/24	4/21	4/18	4/15	4/12	4/09	4/06	4/01
24	4/20	4/16	4/13	4/10	4/07	4/05	4/02	3/29	3/25
20	4/09	4/04	4/01	3/29	3/26	3/23	3/21	3/17	3/13
16	4/01	3/27	3/23	3/20	3/18	3/15	3/12	3/09	3/04

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	9/12	9/17	9/21	9/24	9/27	9/30	10/03	10/06	10/11
32	9/21	9/26	9/30	10/03	10/05	10/08	10/11	10/15	10/19
28	10/01	10/05	10/09	10/12	10/15	10/18	10/21	10/24	10/29
24	10/08	10/15	10/19	10/23	10/27	10/31	11/04	11/08	11/15
20	10/22	10/28	11/01	11/05	11/08	11/12	11/16	11/20	11/26
16	10/30	11/04	11/08	11/12	11/15	11/19	11/22	11/26	12/02

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	168	160	155	150	146	142	137	131	124
32	181	174	169	165	161	157	153	148	141
28	203	196	191	186	182	178	173	168	161
24	224	216	211	206	202	198	193	188	180
20	251	243	237	231	227	222	216	210	202
16	264	256	251	246	242	238	233	227	220

***** 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 1971-2000 serially complete daily data

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Degree Days to Selected Base Temperatures (˚F)

Heating Degree Days (1)

Base Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1387	1072	834	430	158	16	1	15	88	372	850	1269	6492
60	1232	932	680	297	78	3	0	2	31	236	700	1114	5305
57	1139	851	591	227	46	0	0	0	13	167	614	1021	4669
55	1077	800	534	185	31	0	0	0	6	129	558	959	4279
50	927	669	395	102	9	0	0	0	0	60	423	810	3395
32	440	278	76	2	0	0	0	0	0	0	95	340	1231

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	76	130	265	569	930	1180	1339	1277	990	655	236	93	7740
55	0	8	10	62	248	490	626	564	307	70	8	0	2393
57	0	3	5	44	201	430	564	502	253	47	4	0	2053
60	0	0	0	24	140	342	471	411	181	23	0	0	1592
65	0	0	0	6	65	206	317	268	89	4	0	0	955
70	0	0	0	1	22	99	178	150	33	0	0	0	483

Growing Degree Units (2)

Base	Growing Degree Units (Monthly)												Growing Degree Units (Accumulated Monthly)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
40	1	27	112	339	668	928	1075	1015	740	414	91	6	1	28	140	479	1147	2075	3150	4165	4905	5319	5410	5416
45	0	5	63	223	515	778	920	860	591	279	42	1	0	5	68	291	806	1584	2504	3364	3955	4234	4276	4277
50	0	1	26	129	368	628	765	705	444	169	17	0	0	1	27	156	524	1152	1917	2622	3066	3235	3252	3252
55	0	0	7	67	235	478	610	550	310	87	3	0	0	0	7	74	309	787	1397	1947	2257	2344	2347	2347
60	0	0	1	32	125	330	455	395	190	37	0	0	0	0	1	33	158	488	943	1338	1528	1565	1565	1565
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	1	21	81	215	411	613	734	683	470	254	56	2	1	22	103	318	729	1342	2076	2759	3229	3483	3539	3541

(1) Derived from the 1971-2000 Monthly Normals
(2) Derived from 1971-2000 serially complete daily data
Note: For corn, temperatures below 50 are set to 50, and temperatures above 86 are set to 86

Complete documentation available from:
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Notes

a. The monthly means are simple arithmetic averages computed by summing the monthly values for the period 1971-2000 and dividing by thirty. Prior to averaging, the data are adjusted if necessary to compensate for data quality issues, station moves or changes in station reporting practices. Missing months are replaced by estimates based on neighboring stations.

b. The median is defined as the middle value in an ordered set of values. The median is being provided for the snow and precipitation elements because the mean can be a misleading value for precipitation normals.

c. Only observed validated values were used to select the extreme daily values.

d. Extreme monthly temperature/precipitation means were selected from the monthly normals data.
Monthly snow extremes were calculated from daily values quality controlled to be consistent with the Snow Climatology.

e. Degree Days were derived using the same techniques as the 1971-2000 normals.
Compete documentation for the 1971-2000 Normals is available on the internet from:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

f. Mean "number of days statistics" for temperature and precipitation were calculated from a serially complete daily data set .
Documentation of the serially complete data set is available from the link below:

g. Snowfall and snow depth statistics were derived from the Snow Climatology.
Documentation for the Snow Climatology project is available from the link under references.

Data Sources for Tables

Several different data sources were used to create the Clim20 climate summaries. In some cases the daily extremes appear inconsistent with the monthly extremes and or the mean number of days statistics. For example, a high daily extreme value may not be reflected in the highest monthly value or the mean number of days threshold that is less than and equal to the extreme value. Some of these difference are caused by different periods of record. Daily extremes are derived from the station's entire period of record while the serial data and normals data were are for the 1971-2000 period. Therefore extremes observed before 1971 would not be included in the 1971-2000 normals or the 1971-2000 serial daily data set. Inconsistencies can also occur when monthly values are adjusted to reflect the current observing conditions or were replaced during the 1971-2000 Monthly Normals processing and are not reconciled with the Summary of the Day data.

a. Temperature/ Precipitation Tables
   1. 1971-2000 Monthly Normals
   2. Cooperative Summary of the Day
   3. National Weather Service station records
   4. 1971-2000 serially complete daily data

b. Degree Day Table
   1. Monthly and Annual Heating and Cooling Degree Days Normals to Selected Bases derived from 1971-2000 Monthly Normals
   2. Daily Normal Growing Degree Units to Selected Base Temperatures derived from 1971-2000 serially complete daily data

c. Snow Tables
   1. Snow Climatology
   2. Cooperative Summary of the Day

d. Freeze Data Table
   1971-2000 serially complete daily data

References

U.S. Climate Normals 1971-2000, www.ncdc.noaa.gov/normals.html
U.S. Climate Normals 1971-2000-Products Clim20, www.ncdc.noaa.gov/oa/climate/normals/usnormalsprods.html
Snow Climatology Project Description, www.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html
Eischeid, J. K., P. Pasteris, H. F. Diaz, M. Plantico, and N. Lott, 2000: Creating a serially complete, national daily time series of temperature and precipitation for the Western United States. J. Appl. Meteorol., 39, 1580-1591,
www1.ncdc.noaa.gov/pub/data/special/ serialcomplete_jam_0900.pdf