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Thirty-Five Years (1969-2003) of Climatological Data: NMSU's Agricultural Science Center at Farmington, New Mexico

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Plant growth and crop production are intrinsically linked to climate and daily weather conditions. Climate determines the types of plants that can be grown in a particular area and the management techniques required for successful landscapes and agricultural sustainability. Weather affects crop water requirements, timing of planting, cultivation, fertilization and harvest, crop tolerance to disease and pests, total crop yield and product quality. Agricultural and landscape planning begins with a thorough understanding of a locale's climate. To help provide this understanding for the Four Corners region, daily weather observations have been made since 1969 at the New Mexico State University (NMSU) Agricultural Science Center (ASC) at Farmington. The ASC is located in northwestern New Mexico (36° 4' N Lat., 108° 2' W Long.) about seven miles southwest of Farmington at an elevation of 5,640 feet above mean sea level. Two weather-data recording stations are located at the ASC. Station 1 (WS-1) was established at the center in January 1969 and was given an official designation by the National Weather Service (NWS) in 1978. Station 2 (WS-2) was installed approximately 400 yards south of WS-1 in 1985. This is an automated, computer-linked station that is operated and maintained by the New Mexico Climate Center (NMCC) at NMSU in Las Cruces. This report summarizes the weather observations from both of these stations between 1969 and 2003.

SUMMARY

Compared to the mountainous areas that surround it, climate at the ASC is relatively dry and mild. Summer days are typically warm (90-95°F) and dry, while nights are cool (55-60°F). During the winter months of December and January, air temperatures commonly fall below 20°F in early morning, while daytime highs typically range between 35 and 45°F. The frost-free period averages 162 days from early May to mid-October, but crops such as potatoes, corn, spring cereals, etc. are usually planted before May 1. Throughout the year, days are typically clear and sunny. When precipitation events occur, they are usually of short duration and deposit less than 0.10 inch of rain per event. During the winter, snows are infrequent and snow depths greater than 6 inches are uncommon. Total annual precipitation averages 8.2 inches with about half of the total occurring in the so-called monsoon season (July-October).

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Twenty-four-hour rainfall amounts exceeding 1 inch have occurred less than 20 times during the entire 35 years of record. Some of the more extreme rainfall events were 1.5 inches on Oct. 22, 1969; 1.9 inches on Sept. 5-6, 1970; 2.7 inches on July 20-23, 1986; 1.9 inches on April 4-5, 1997; and 3.0 inches on Sept. 2-4, 2002. Compared to southern and eastern New Mexico, winds are relatively calm during the summer and winter, averaging about 110 miles per day (4.6 mph) between July and January. During March, April, and May, strong westerly winds are common and average wind velocity increases to about 150 miles per day (6.3 mph).

MATERIALS AND METHODS

Weather Station 1

Air temperature measurements were recorded from standard U.S. Weather Bureau maximum and minimum thermometers housed in a regulation, louvered instrument shelter. A standard 8-inch diameter rain gauge was installed in 1969 to measure total daily precipitation. A battery-operated, constant-reading rain gauge was installed in 1982 to measure precipitation rate. Wind movement in miles per day has been recorded at two heights since 1980 using three-cup anemometers. One is located 6 inches above a standard Class-A metal evaporation pan, while the other is set at a height of 6 feet above the soil surface.

Water evaporation (pan) was measured daily from a Class-A pan with a hook-gauge from May 1 through September 30 in all years from 1974 to 2003. Pan measurements were also made throughout April in 1977 through 1981, 1986, and from 1992 through 2003. Complete October measurements were recorded in 1972, 1974 through 1978, 1984 and 1985, 1987 and 1988, 1990, and from 1992 through 2003.

Maximum and minimum bare-soil temperatures at a depth of 4 inches have been recorded since 1976, using buried temperature sensors. The soil type is a Doak fine sandy loam with about 70% sand, 20% silt, and 10% clay.

Using a pyranometer, daily solar radiation measurements were recorded from 1977 through 2003. Between January 1977 and September 1996, the instrument was set near the instrument shelter at a height of 6.5 feet. Subsequent readings were obtained at a 10-foot height from WS-2. Temperature and precipitation data recorded at WS-1 are summarized on the NWS Web site linked to: http://weather.nmsu.edu/nmcccooperator/farmington_ag_sci.htm.

Weather Station 2

The NMCC weather station consisted of air temperature, relative humidity, solar radiation, wind speed, wind direction, and rain-depth sensors wired to a Campbell CR10 datalogger. The datalogger, powered by a 12-volt, deep-cycle, lead-acid battery, and all sensors were mounted to a 3-meter high, steel and aluminum tripod. A solar-panel provided recharge to the battery. Measurements were recorded to the datalogger every 15 minutes, and the data were downloaded to a PC at the NMCC via modem and telephone line. WS-2 data are accessible from the NMCC Web site: http://weather.nmsu.edu/cgi-shl/cns/oldformat.pl.

Unless noted otherwise, data presented in this report are from WS-1.

RESULTS

Air Temperature

Between 1969 and 2003, the daily minimum, mean, and maximum air temperatures averaged over all months and years were 38.7, 52.6, and 66.4°F, respectively (fig. 1, tables 1, 2, and 3). Average annual minimums ranged from 36.1°F in 1975 to 40.8°F in 2001 (table 1), while average maximums ranged from 63.7°F in 1982 to 69.3°F in 2003 (table 3). The

highest annual mean temperature of 55.1°F during the 35-year period occurred in 2003 (table 2). This was primarily due to record or near record high average minimum (64, 62, and 44°F) and maximum (97, 91, and 74°F) temperatures for July, August, and October, respectively (tables 1 and 3). The coolest year on record (1975) appeared to be a result of lower than average minimum temperatures in May and June (table 1).

January and December were the coldest months, having average daily minimum, mean, and maximum temperatures of about 20, 31, and 42°F, respectively (fig. 2). July and August had the highest average daily temperatures (60°F minimum, 75°F mean, and 90°F maximum).

Frost-Free Period

The frost-free period (consecutive days above 32°F) averaged 162 days over the 35 years (table 4). The shortest frost-free period occurred in 1999 (115 days), the only year in which a June frost was recorded. The longest frost-free period occurred in 1977 (193 days). The average dates of the last spring frost and first autumn frost were May 5 and Oct. 13, respectively. The earliest and latest dates of the last spring frost were April 10, 1990 and June 5, 1999, respectively. The earliest and latest dates of the first fall frost were Sept. 18, 1971 and Nov. 12, 1988 (table 4). The number of consecutive days without a killing frost (28°F or less) averaged 182. A killing frost results in substantial damage to most plants. A temperature of 28°F for more than 30 minutes, for example, will kill approximately 10% of apple or cherry blossoms during flowering (Longstroth, 2001).

Extreme Temperatures

Although the average number of days between the first autumn frost and last spring frost was 204, the temperature dropped below 32°F on only 139 of those days (table 5). In the months of November through March, the temperature dropped below freezing about 25 days per month on average (table 5). The temperature dropped to zero or below 1.8 days per year on average between 1969 and 1992 but fell below zero only once since 1992 (table 5). The coldest temperatures recorded during the 35-year period were -18°F, -16°F, and -14°F and occurred in January 1971, December 1990, and February 1989, respectively (table 6).

The temperature exceeded 95°F about 13 days per year on average and, while it exceeded 100°F on only 28 days of the entire 35-year period, nine of the 28 days occurred in July 2003. The highest recorded temperature of 103°F occurred in July 1989, 1990, and 2003 (table 7).

Precipitation

From 1969 through 2003, the average annual precipitation was 8.16 inches (fig. 3 and table 8). Annual precipitation extremes ranged from a low of 3.57 inches in 1976 to a high of 14.65 inches in 1986 (fig. 3). The average monthly precipitation ranged from a low of 0.26 inches in June to 1.10 inches in August (fig. 4). The greatest amount of rainfall in a single month was 4.10 inches in July 1986. In 22 months over the 35 years, there was no measurable precipitation (table 8).

Wind

Since 1980, the average daily wind run at the 6-foot height has been 123.4 miles/day (5.1 mph). But it varied considerably between the spring months and rest of the year (fig. 5 and table 9). March and April were the windiest months, with an average daily wind run at the 6-foot height of more than 150 miles/day. The calmest months of August through December had an average daily wind run of about 110 miles (fig. 5). In 1991, March and April were particularly windy with an average daily wind run at the 6-foot height of 190 miles (table 9).

Solar Radiation

From 1977 to 2003, average daily solar radiation, measured as gram calories/cm2 (Langley's), ranged from a low of about 200/day in January and December to a high of about 625/day in June and July (fig. 6 and table 10). Total annual radiation averaged about 154,000 Langley's (421 Langley's/day).

Pan Evaporation

Evaporation is affected by solar radiation, temperature, humidity and wind. With appropriate correction factors, it is sometimes used as an index of plant water-use. From 1974 to 2003, total pan evaporation between May 1 and Sept. 30 averaged 57 inches (table 11) or 0.37 inches/day (table 12). Average total monthly evaporation was greatest in June and July (13.1 inches) (table 11 and fig. 7). This corresponded to an average daily evaporation rate of about 0.43 inches (table 12).

Soil Temperature

The average daily bare soil temperature 4 inches below the surface did not exceed 50°F (the minimum seed germination temperature for many crops) until April of each year (fig. 8). In July and August, the daily mean temperature at this depth equaled or exceeded 80°F (fig. 8 and table 13). Average soil temperature extremes ranged from a low of 25.6°F in January (table 14) to a high of 101.0oF in July (table 15).

Growing Degree-Days

Growing degree-days (GDD) or heat units are used to rate the maturity of various plant cultivars, especially corn. Plant development is related to temperature, and each crop has an optimum temperature range for growth. That is, there is a minimum temperature below which plants will not grow (minimum cutoff or base temperature) and a maximum temperature at which plant growth rate will stabilize or decrease (maximum cutoff temperature). The average daily temperature (mean of daily minimum and maximum temperatures) minus the base temperature is equal to GDD for that day. However, if the observed minimum temperature for the day is less than the minimum cutoff temperature (COmin), then it is set equal to COmin. Correspondingly, if the observed maximum temperature exceeds the maximum cutoff temperature (COmax), then it is set equal to COmax prior to calculating the average. In corn, base and COmin is 50°F and COmax is 86°F (Eckert, 2004). Over the 35 years, total corn GDD from May 1 to Sept. 30 averaged 2,865 (table 16). Total average monthly GDD during this period ranged from a low of 400 in May (12.9/day) to a high of 711 (22.9/day) in July (fig. 9 and table 16).

Reference Evapotranspiration

Evapotranspiration (ET) refers to the volume of water used by a crop during a given time period. It includes water that is actively transported through the plant from the roots to leaves during transpiration and water that is lost from plant and soil surfaces through evaporation. If crops are healthy and soil moisture is not limiting, plant size and weather (radiation, air temperature, humidity, and wind speed) are the primary factors affecting crop ET (Allen, et al., 1998). Reference ET (ETo) refers to the ET of a reference crop such as grass or alfalfa that is of a certain height and is growing under optimum conditions for maximum production. Since ETo has been correlated with the weather parameters referred to above, it can be calculated when these parameters are available. Correction values or crop coefficients (Kc), if available, can then be applied to ETo to estimate a particular crop's ET rates or water requirements during the season. These estimates can then be used in irrigation scheduling. Since different researchers have derived unique mathematical formulas to calculate ETo, to effectively use published Kc values for irrigation scheduling,

the ETo formula used to formulate the Kc must be known.

From 1996 to 2003, average daily ETo (using WS-2 data and a modified, grass-referenced Penman formula from the New Mexico Climate Center: http://weather.nmsu.edu/pmcomp.htm) ranged from 0.08 inch/day in January and December to 0.38 inch/day in June (fig. 10). Total annual ETo averaged 80.5 inches (table 17). From May through August, the active growing season for many crops, ETo averaged 10.4 inches/month or 0.34 inch/day.

Metric Conversions

Data reported in figures 1-10 and tables 1-17 are in English units. The formulas used to convert English units to standard international (SI) or metric units are:

Temperature: $^{o}C = 5/9 (^{o}F - 32)$
Precipitation, pan evaporation, and ETo:
mm = inches x 25.4
Wind speed: km/day = miles/day x 1.609
Solar radiation:
joules/m2 /day = Langleys x (4.19 x 104)
Growing degree-days (^{o}C based) =
growing degree-days (^{o}F based) x 5/9

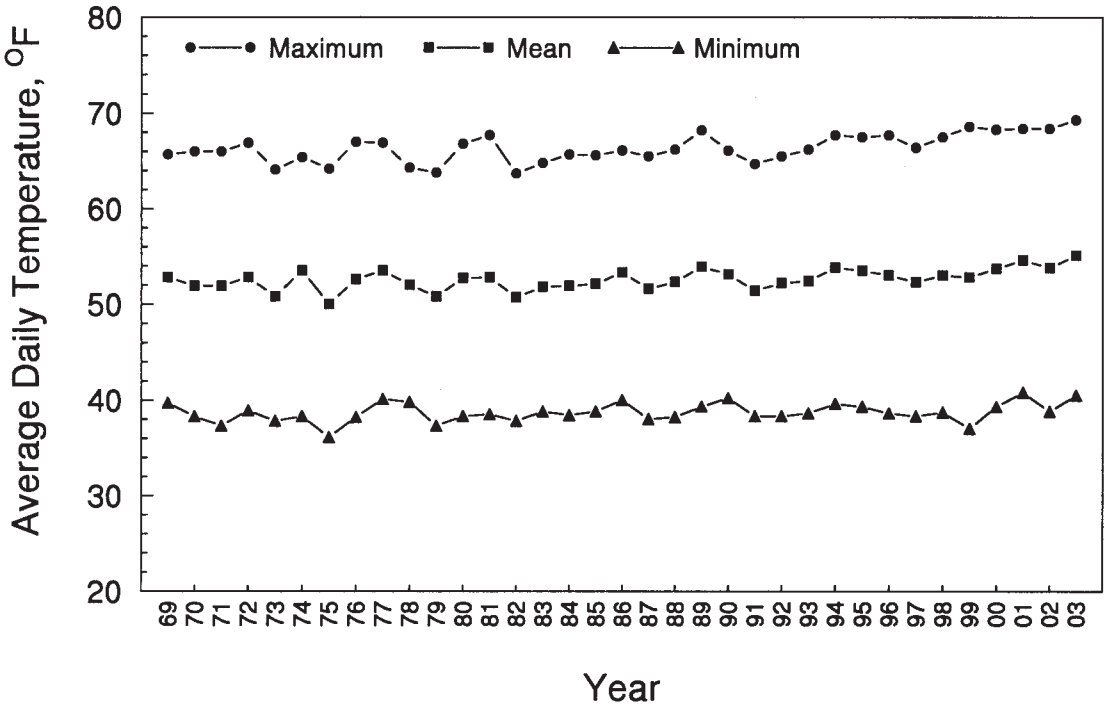

Figure 1. Average daily minimum, mean, and maximum air temperature for each year at NMSU's Agricultural Science Center at Farmington, 1969-2003.

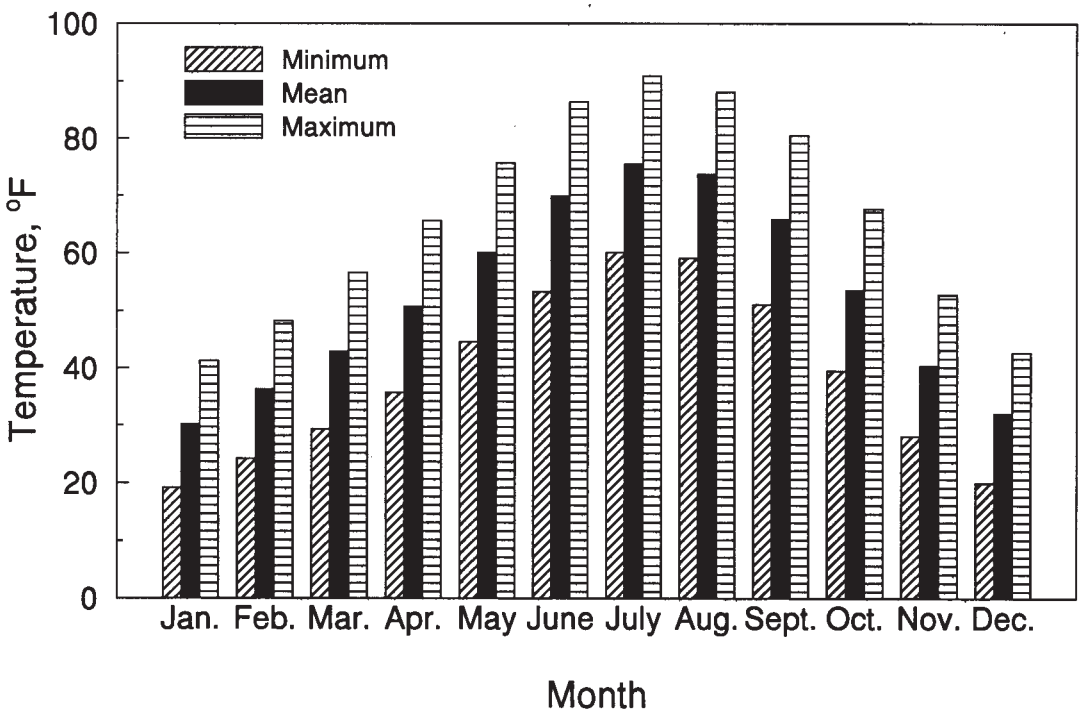

Figure 2. Average daily minimum, mean, and maximum air temperature for each month at NMSU's Agricultural Science Center at Farmington, 1969-2003.

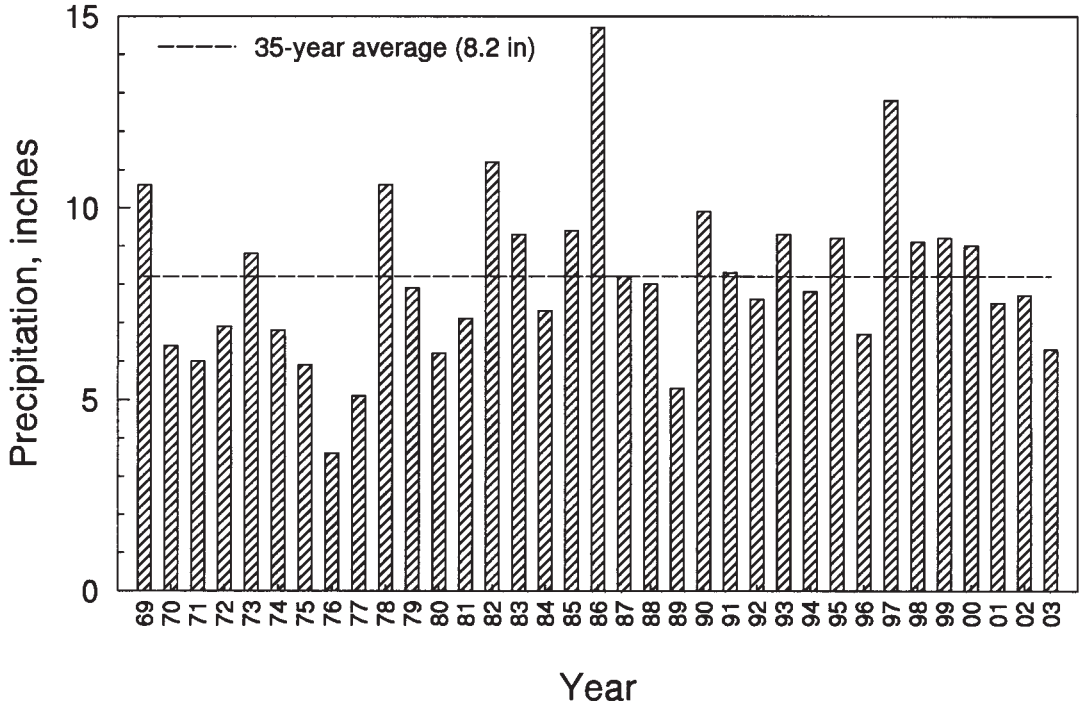

Figure 3. Total annual precipitation measured at NMSU's Agricultural Science Center at Farmington, 1969-2003.

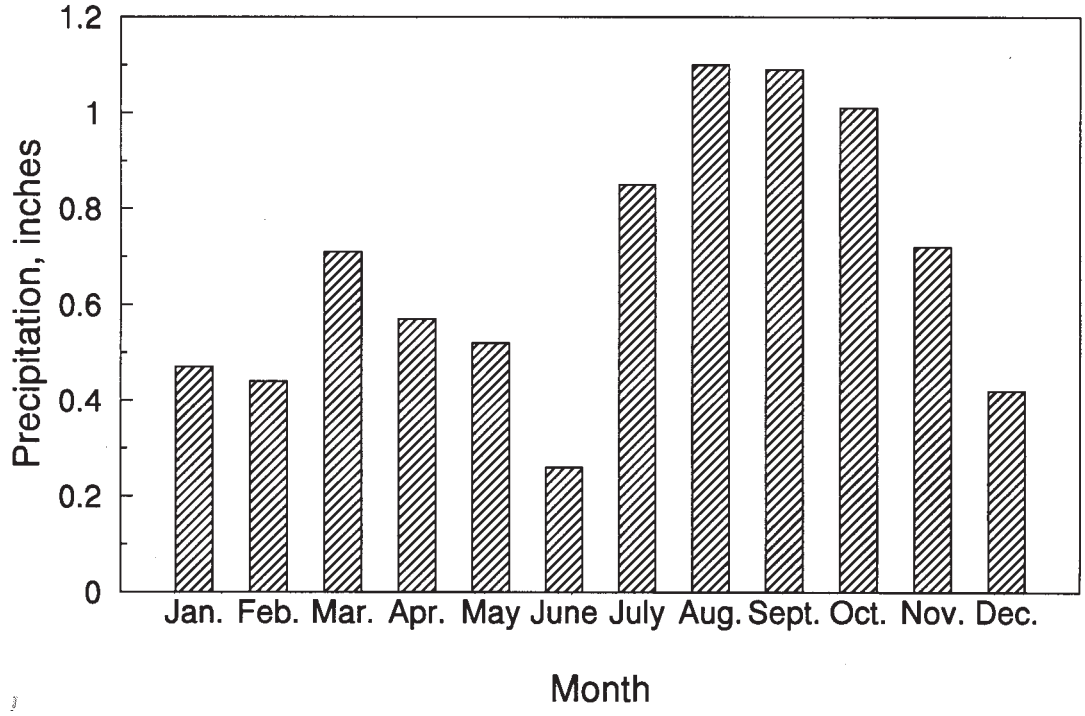

Figure 4. Average monthly precipitation measured at NMSU's Agricultural Science Center at Farmington, 1969-2003.

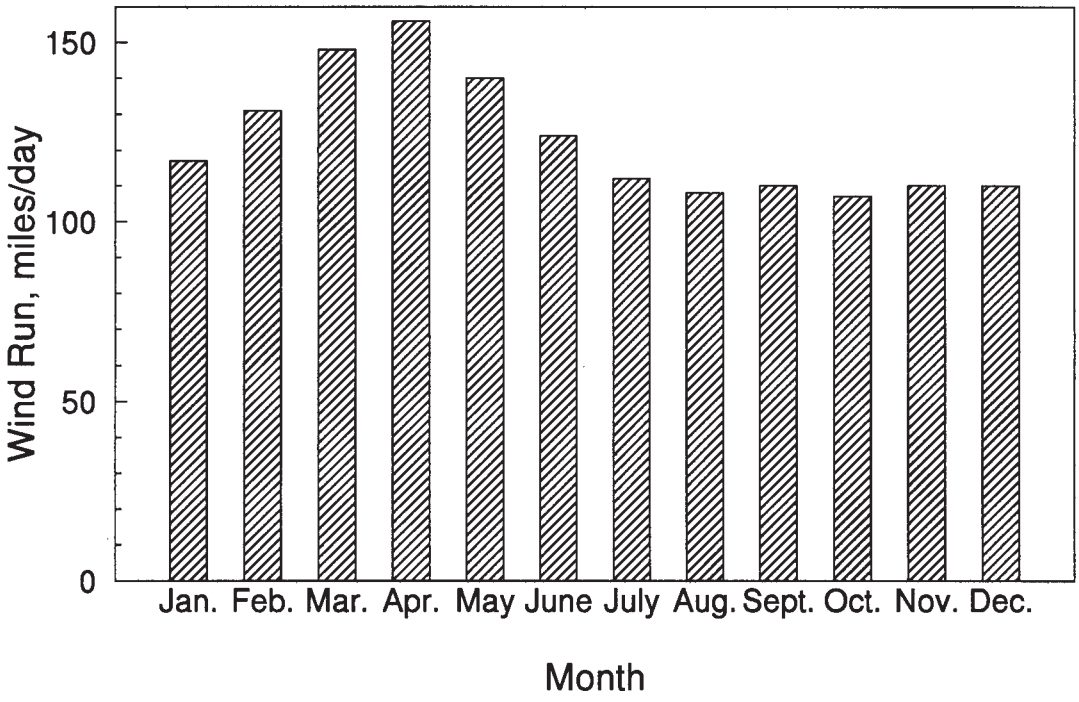

Figure 5. Average daily wind run at a height of 6 feet for each month at NMSU's Agricultural Science Center at Farmington, 1969-2003.

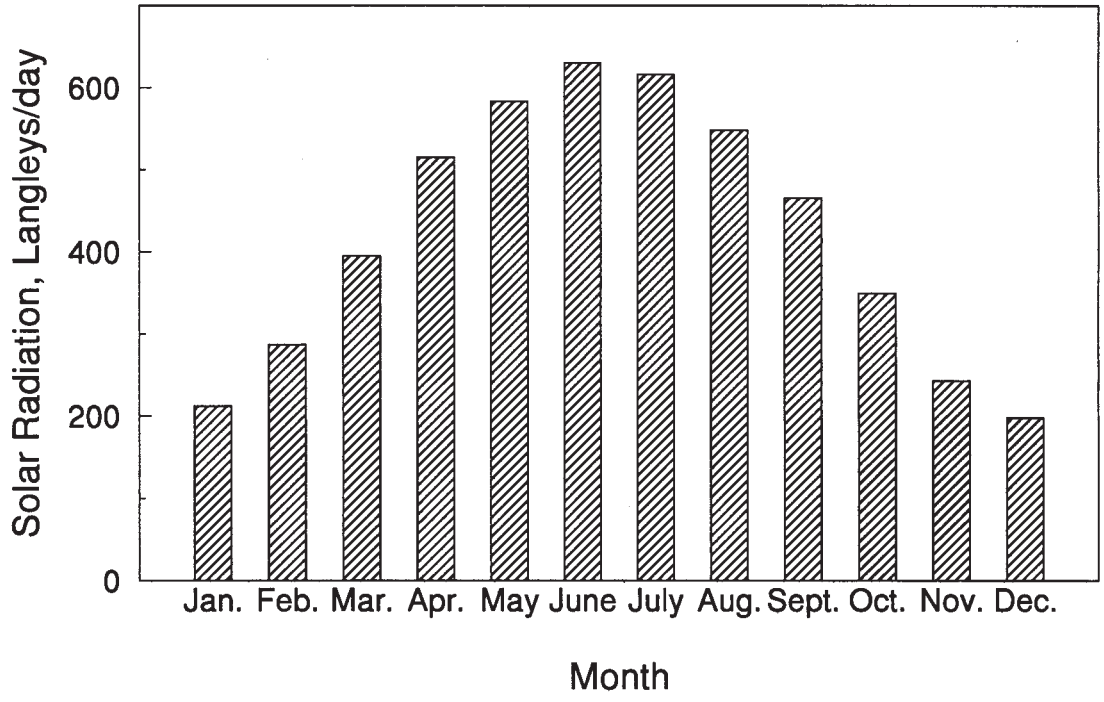

Figure 6. Average daily solar radiation for each month at NMSU's Agricultural Science Center at Farmington, 1977-2003.

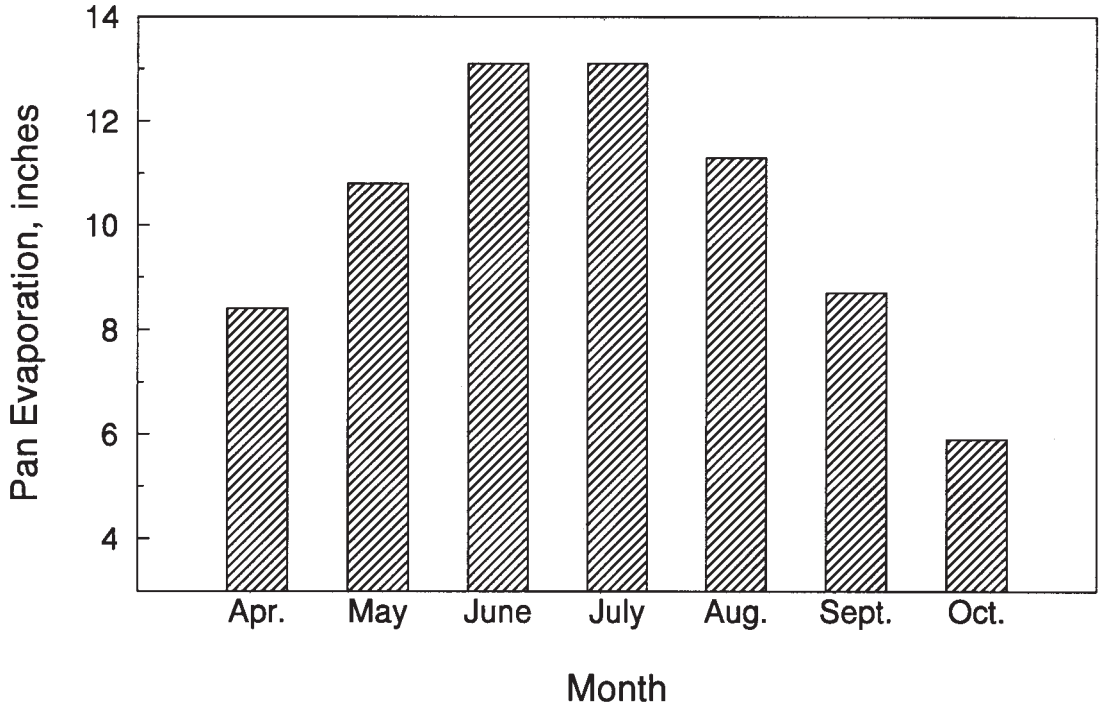

Figure 7. Average monthly pan evaporation at NMSU's Agricultural Science Center at Farmington, 1972-2003.

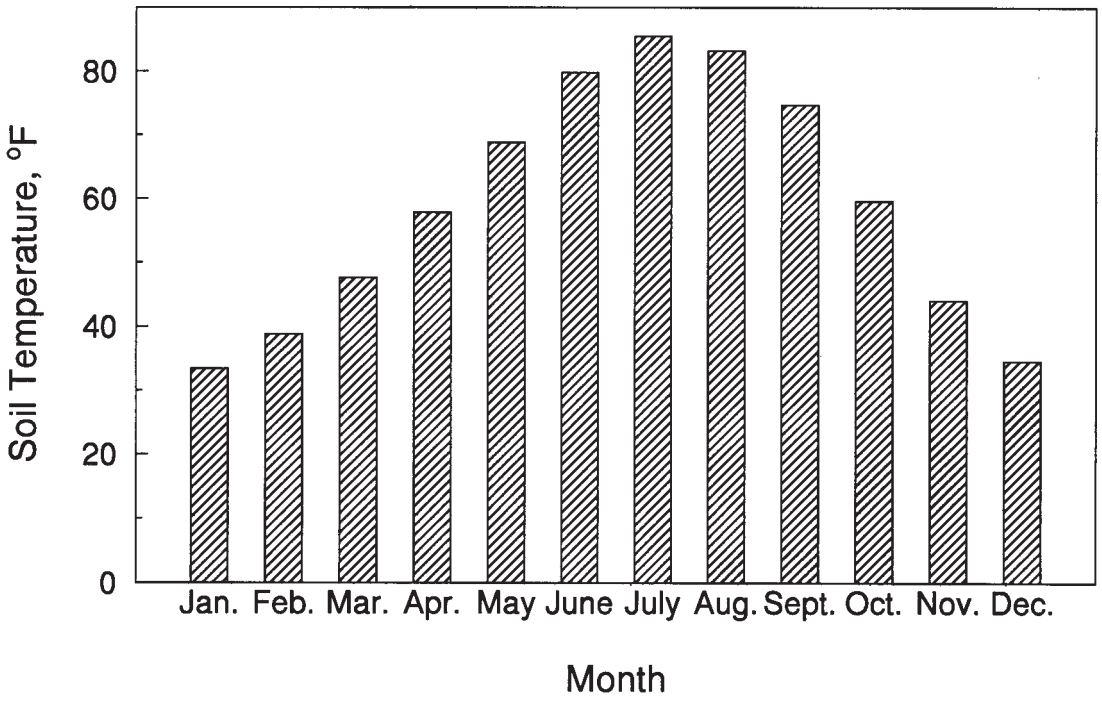

Figure 8. Average monthly bare soil temperature 4 inches below the surface at NMSU's Agricultural Science Center at Farmington, 1976-2003.

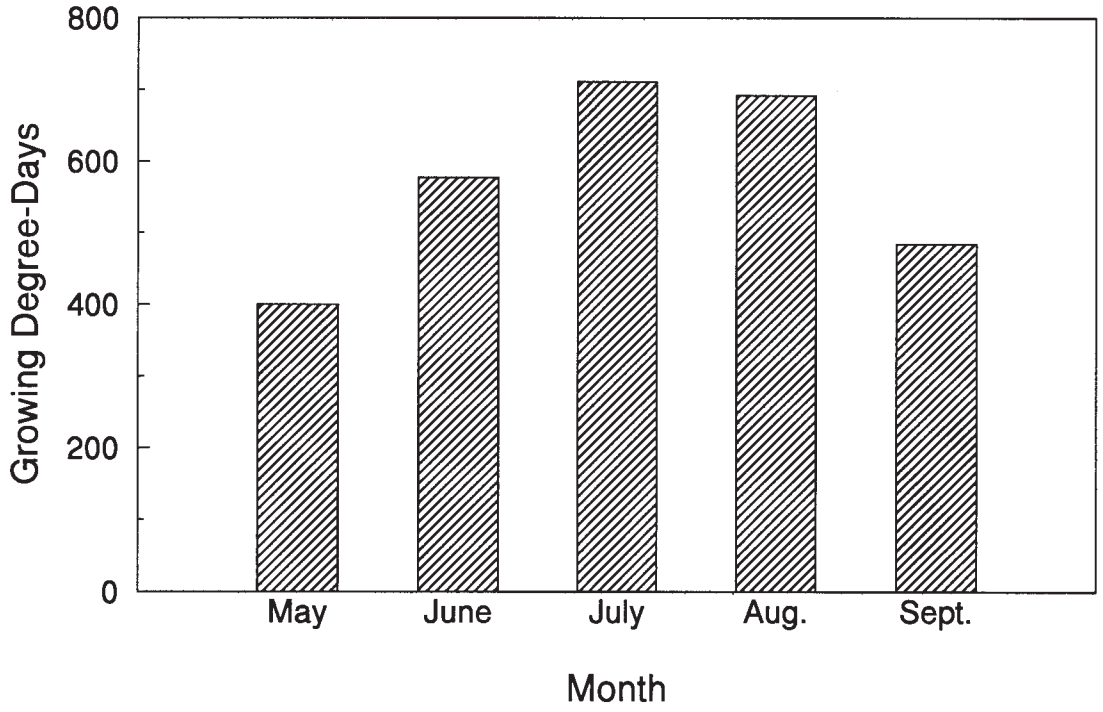

Figure 9. Average total monthly (May-September) growing degree-days at NMSU's Agricultural Science Center at Farmington, 1969-2003.

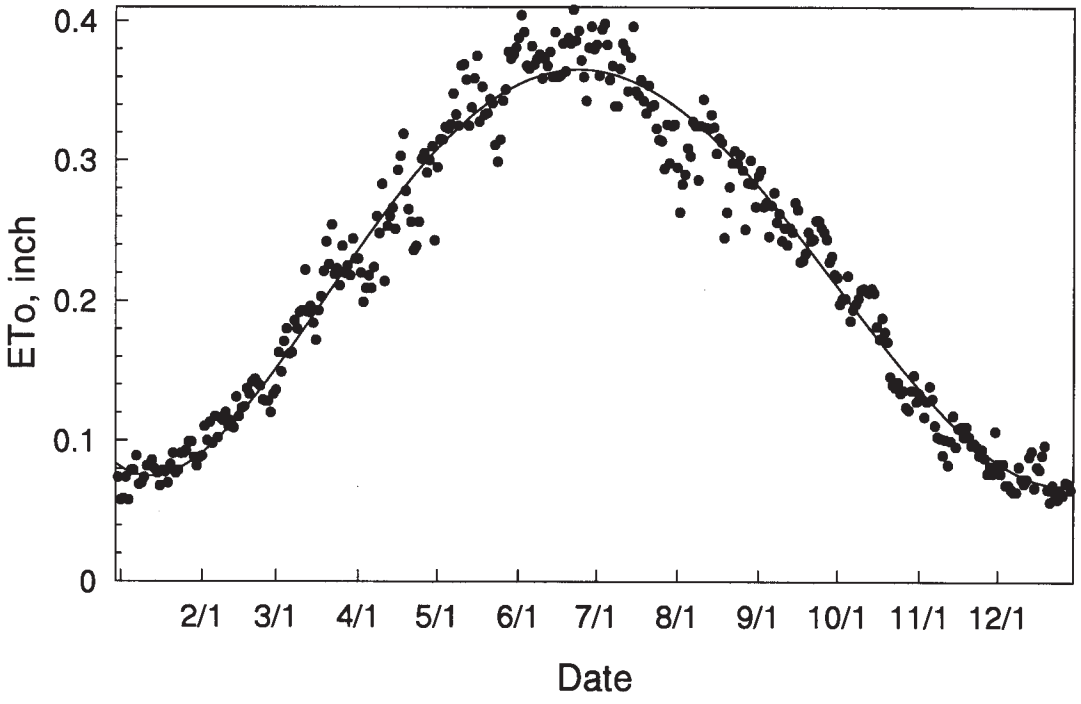

Figure 10. Average daily reference evapotranspiration (ETo) at NMSU's Agricultural Science Center at Farmington based on calculations from the New Mexico Climate Center, 1996-2003.

Table 1. Average daily minimum temperature (°F) for each month at NMSU's Agricultural Science Center at Farmington, 1969-2003.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1969	25	24	**24***	35	**48****	51	61	**62****	55	39	30	22	**39.7**
1970	20	27	26	**29***	43	53	62	**62****	49	36	30	22	**38.3**
1971	16	20	26	33	42	54	61	60	48	38	28	21	**37.3**
1972	18	22	31	36	43	55	62	60	53	**45****	27	15	**38.9**
1973	**12***	26	29	32	44	52	60	60	48	40	31	19	**37.8**
1974	14	**17***	33	33	46	57	61	59	50	44	28	17	**38.3**
1975	14	23	28	31	**40***	**48***	60	57	50	39	24	19	**36.1***
1976	16	28	25	36	45	53	62	59	54	37	26	17	**38.2**
1977	15	22	25	39	44	**59****	62	61	55	42	31	**26****	**40.1**
1978	25	25	33	38	43	53	61	57	52	43	**33****	15	**39.8**
1979	16	22	28	34	44	50	58	57	53	40	25	20	**37.3**
1980	**26****	28	27	33	41	52	59	58	50	**35***	27	24	**38.3**
1981	20	23	29	39	44	54	58	**56***	50	37	30	22	**38.5**
1982	18	21	30	34	43	51	58	60	52	**35***	29	22	**37.8**
1983	21	26	31	31	41	51	58	61	52	41	29	24	**38.8**
1984	16	20	27	33	**48****	53	61	60	52	36	30	25	**38.4**
1985	20	19	32	38	46	54	61	59	48	41	29	19	**38.8**
1986	23	26	33	39	44	55	59	60	50	40	29	22	**39.8**
1987	18	25	26	39	45	53	**57***	57	49	40	28	19	**37.0**
1988	13	24	25	36	44	56	61	60	48	43	29	19	**38.2**
1989	16	24	34	40	47	54	63	58	54	40	26	16	**39.3**
1990	18	25	**35****	**41****	45	**59****	63	60	**56****	40	30	**11***	**40.2**
1991	16	25	30	34	44	53	59	59	51	40	27	21	**38.3**
1992	18	27	32	40	**48****	52	**57***	58	50	40	**22***	16	**38.4**
1993	**26****	28	30	36	45	52	**57***	58	48	38	25	20	**38.4**
1994	19	24	31	38	46	56	60	61	50	39	27	24	**39.6**
1995	24	**29****	31	35	43	50	58	61	52	37	29	23	**39.3**
1996	19	28	29	34	47	54	60	58	47	38	28	21	**38.6**
1997	19	24	28	32	46	54	59	59	54	37	28	20	**38.2**
1998	22	25	28	33	45	**48***	62	59	54	40	29	19	**38.5**
1999	21	24	31	34	43	50	59	57	**46***	36	28	15	**37.0**
2000	22	28	29	37	44	54	58	58	52	42	25	23	**39.3**
2001	21	26	32	40	47	54	63	59	54	42	32	19	**40.8****
2002	19	18	26	**41****	46	57	61	58	51	39	27	22	**38.8**
2003	25	24	31	35	47	53	**64****	**62****	50	44	29	22	**40.5**
Mean	**19.2**	**24.2**	**29.3**	**35.7**	**44.6**	**53.3**	**60.1**	**59.1**	**51.1**	**39.5**	**28.1**	**20.0**	**38.7**

*Lowest average daily minimum temperature for month or year during 35-year period.
** Highest average daily minimum temperature for month or year during 35-year period.

Table 2. Average daily mean temperature (°F) in each month at NMSU's Agricultural Science Center at Farmington, 1969-2003.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1969	34	35	**37***	52	63	67	76	76	69	50	40	34	**52.8**
1970	31	40	39	**44***	60	68	76	76	64	50	42	33	**51.9**
1971	30	34	43	50	58	71	77	74	64	52	40	30	**51.9**
1972	30	38	48	53	60	70	78	74	66	54	36	26	**52.8**
1973	**22***	35	39	45	59	68	75	75	63	55	44	30	**50.8**
1974	24	**28***	48	48	63	74	75	74	65	55	40	28	**51.8**
1975	26	34	40	46	**56***	**66***	74	72	64	54	38	30	**50.0***
1976	28	41	40	52	60	70	77	74	66	51	40	32	**52.6**
1977	25	37	39	54	59	74	76	75	68	56	43	36	**53.5**
1978	33	34	46	52	**56***	69	76	**71***	65	56	42	**24***	**52.0**
1979	24	32	40	50	58	67	74	72	69	56	**35***	32	**50.8**
1980	33	39	40	48	57	71	76	73	65	52	41	**37****	**52.7**
1981	30	37	41	55	59	71	74	72	65	51	44	34	**52.8**
1982	30	31	42	49	57	67	73	72	65	50	40	32	**50.7**
1983	31	36	42	45	**56***	**66***	74	75	68	54	41	34	**51.8**
1984	28	34	41	47	**64****	69	76	74	66	**47***	42	35	**51.9**
1985	30	32	41	53	61	71	76	74	62	54	40	31	**52.1**
1986	**40****	39	47	51	60	70	**72***	74	62	52	40	33	**53.3**
1987	29	36	39	53	59	70	73	**71***	65	56	39	29	**51.6**
1988	24	36	41	51	59	72	76	74	64	58	41	31	**52.3**
1989	27	35	**49****	**57****	63	70	78	72	69	55	41	31	**53.9**
1990	29	36	46	54	59	**75****	76	73	69	54	42	**24***	**53.1**
1991	25	37	41	49	59	68	75	74	66	56	38	29	**51.4**
1992	28	39	45	56	62	68	**72***	73	66	56	**35***	26	**52.2**
1993	35	38	44	51	61	69	74	**71***	64	52	38	32	**52.4**
1994	33	35	46	52	61	73	77	76	66	53	38	35	**53.8**
1995	33	**44****	44	48	57	67	74	76	67	53	44	35	**53.5**
1996	32	41	43	51	**64****	71	76	73	**61***	52	40	32	**53.0**
1997	29	36	46	47	61	70	74	73	68	52	41	31	**52.3**
1998	34	35	42	48	61	67	77	74	**70****	54	42	32	**53.0**
1999	35	39	48	49	58	68	74	**71***	63	54	**45****	30	**52.8**
2000	34	40	42	53	63	71	75	75	68	54	**35***	34	**53.7**
2001	31	37	45	54	63	71	77	74	**70****	57	**45****	31	**54.6**
2002	32	34	42	**57****	63	**75****	78	74	66	53	40	32	**53.8**
2003	38	36	44	51	63	71	**81****	**77****	66	**59****	41	34	**55.1****
Mean	**30.2**	**36.3**	**42.9**	**50.7**	**60.1**	**69.9**	**75.5**	**73.7**	**65.8**	**53.6**	**40.4**	**32.0**	**52.6**

* Lowest average daily mean temperature for month or year during 35-year period.
** Highest average daily mean temperature for month or year during 35-year period.

Table 3. Average daily maximum temperature (°F) in each month at NMSU's Agricultural Science Center at Farmington, 1969-2003.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1969	42	46	**50***	69	78	**81***	91	90	83	62	51	45	**65.7**
1970	42	54	52	60	78	84	91	**91****	78	63	55	44	**66.0**
1971	43	48	59	66	74	87	93	87	80	65	51	39	**66.0**
1972	43	54	**66****	70	78	86	93	87	80	63	**46***	37	**66.9**
1973	32	42	**50***	**59***	74	84	90	90	79	70	57	42	**64.1**
1974	34	**40***	62	64	80	91	89	88	80	66	52	39	**65.4**
1975	37	44	52	60	71	85	89	88	79	70	53	42	**64.2**
1976	41	54	56	68	76	87	92	88	79	65	53	45	**67.0**
1977	34	51	53	69	74	90	90	89	81	71	54	47	**66.9**
1978	41	44	58	65	**70***	85	90	86	78	70	51	**33***	**64.3**
1979	**31***	42	52	65	72	84	90	86	84	71	**46***	43	**63.8**
1980	41	50	53	64	72	89	93	88	80	66	55	**51****	**66.8**
1981	49	51	53	70	74	88	90	88	80	65	58	46	**67.7**
1982	41	41	54	63	72	84	89	85	78	65	51	41	**63.7***
1983	40	46	53	**59***	72	82	90	89	83	68	52	43	**64.8**
1984	41	48	56	61	80	84	91	87	80	**60***	55	45	**65.7**
1985	41	44	55	67	75	88	91	89	76	67	51	43	**65.6**
1986	49	51	61	64	75	84	**86***	89	**75***	65	50	44	**66.1**
1987	40	47	52	68	74	87	90	86	80	71	51	40	**65.5**
1988	35	47	57	65	75	87	92	87	80	73	53	43	**66.2**
1989	38	45	63	**73****	79	86	93	87	84	69	56	45	**68.2**
1990	41	47	58	67	73	90	90	87	82	68	54	36	**66.1**
1991	35	49	53	65	75	84	90	88	80	71	49	37	**64.7**
1992	38	50	58	71	76	84	**86***	87	81	72	48	36	**65.6**
1993	44	48	59	67	76	86	91	85	79	66	50	43	**66.2**
1994	46	46	61	66	76	90	93	**91****	81	66	50	46	**67.7**
1995	42	**58****	58	61	71	83	91	90	81	69	59	47	**67.5**
1996	45	54	58	68	**82****	87	91	89	76	66	53	43	**67.7**
1997	39	48	63	61	77	86	90	87	82	67	54	42	**66.3**
1998	45	46	57	62	78	85	92	90	**86****	68	56	45	**67.5**
1999	50	54	64	63	73	86	89	**84***	80	73	**63****	44	**68.6**
2000	47	53	56	68	**82****	89	93	**91****	84	66	**46***	45	**68.3**
2001	41	48	57	68	79	89	92	88	85	72	59	43	**68.4**
2002	45	49	57	72	79	**93****	94	90	80	66	53	43	**68.4**
2003	**51****	48	56	67	79	88	**97****	**91****	82	**74****	52	46	**69.3****
Mean	**41.3**	**48.2**	**56.6**	**65.6**	**75.7**	**86.4**	**90.9**	**88.1**	**80.5**	**67.7**	**52.8**	**42.7**	**66.4**

* Lowest average daily maximum temperature for month or year during 35-year period.
** Highest average daily maximum temperature for month or year during 35-year period.

Table 4. Frost dates and number of consecutive frost-free days at NMSU's Agricultural Science Center at Farmington, 1969-2003.

	Less than or equal to 32°F			Less than or equal to 28°F		
Year	Last Spring Frost (date)	First Fall Frost (date)	Frost-Free Period (days)	Last Spring Killing Frost (date)	First Fall Killing Frost (date)	Killing Frost-free-period (days)
1969	April 27	Oct. 5	161	April 26	Oct. 6	163
1970	May 2	Oct. 8	159	May 1	Oct. 9	161
1971	May 9	**Sept. 18***	132	April 27	**Sept. 18***	**144***
1972	May 2	Oct. 30	181	April 27	Oct. 31	187
1973	May 2	Oct. 11	162	May 2	Oct. 27	178
1974	May 21	Oct. 30	162	May 20	Nov. 4	168
1975	May 8	Oct. 14	159	May 7	Oct. 14	160
1976	April 27	Oct. 7	164	April 27	Oct. 19	175
1977	April 21	Oct. 31	**193****	April 5	Nov. 2	211
1978	May 6	Oct. 26	173	May 6	Nov. 13	191
1979	May 12	Oct. 21	162	April 20	Oct. 22	185
1980	May 26	Oct. 16	143	**May 25****	Oct. 17	145
1981	May 9	Oct. 16	160	April 5	Oct. 17	194
1982	May 6	Oct. 6	153	April 21	Oct. 10	172
1983	May 19	Sept. 21	125	May 17	Nov. 9	176
1984	May 8	Oct. 15	160	May 8	Oct. 16	161
1985	May 14	Sept. 30	139	April 1	Nov. 1	214
1986	April 27	Oct. 12	168	April 27	Oct. 13	169
1987	April 21	Oct. 19	181	April 21	Nov. 11	204
1988	May 7	**Nov. 12****	189	April 11	**Nov. 16****	**219****
1989	April 30	Oct. 18	171	March 21	Oct. 27	**219****
1990	**April 10***	Oct. 9	181	March 31	Oct. 21	204
1991	May 5	Oct. 28	176	March 29	Oct. 29	214
1992	April 21	Oct. 8	170	**March 19***	Oct. 8	203
1993	May 9	Oct. 19	163	April 20	Oct. 27	190
1994	April 30	Oct. 17	170	April 8	Oct. 31	206
1995	April 25	Oct. 6	164	April 18	Oct. 6	171
1996	April 30	Sept. 19	142	April 29	Oct. 18	172
1997	May 2	Oct. 13	163	May 2	Oct. 13	163
1998	May 15	Oct. 6	144	April 19	Oct. 6	170
1999	**June 5****	Sept. 28	**115***	April 16	Sept. 29	166
2000	May 12	Oct. 14	154	April 3	Nov. 2	212
2001	April 23	Oct. 11	170	April 13	Oct. 11	180
2002	April 22	Oct. 4	165	April 22	Nov. 4	196
2003	May 11	Oct. 27	168	April 8	Oct. 27	201
Mean	**May 5**	**Oct. 13**	**162**	**April 21**	**Oct. 22**	**182**

*Earliest date (or shortest frost-free period).
**Latest date (or longest frost-free period).

Table 5. Number of days 32°F or below and 0°F or below in the winter, spring, and fall months at NMSU's Agricultural Science Center at Farmington, 1969-2003.

	Number of Days 32°F or Below										Number of Days 0°F and Below			
Year	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Total**	**Jan.**	**Feb.**	**Dec.**	**Total**
1969	22	26	25	7	0	0	7	22	29	**138**	0	0	0	**0**
1970	29	25	26	23	2	0	12	23	30	**170**	1	0	0	**1**
1971	29	27	22	13	1	2	8	26	27	**155**	4	0	0	**4**
1972	31	27	19	10	2	0	2	24	31	**146**	0	0	0	**0**
1973	31	26	25	17	1	0	5	16	28	**149**	0	0	0	**0**
1974	30	28	14	14	2	0	2	24	30	**144**	2	0	0	**2**
1975	29	27	24	15	3	0	6	25	30	**159**	2	0	0	**2**
1976	31	22	24	8	0	0	10	22	31	**148**	2	0	0	**2**
1977	31	28	26	8	0	0	1	20	30	**144**	3	0	0	**3**
1978	28	21	12	6	2	0	1	14	29	**113**	0	1	5	**6**
1979	29	27	25	11	3	0	5	24	31	**155**	3	1	0	**4**
1980	23	21	25	15	2	0	12	18	28	**144**	0	0	0	**0**
1981	29	26	24	3	1	0	11	19	31	**144**	0	0	0	**0**
1982	29	25	18	12	1	0	12	22	29	**148**	1	2	0	**3**
1983	31	25	18	15	6	1	0	18	26	**140**	0	0	0	**0**
1984	31	29	24	15	1	0	12	18	29	**159**	0	0	0	**0**
1985	31	25	16	5	1	1	2	19	30	**130**	0	1	0	**1**
1986	28	21	20	6	0	0	6	18	29	**128**	0	0	0	**0**
1987	28	25	24	10	0	0	3	22	31	**143**	0	0	0	**0**
1988	31	25	27	9	2	0	0	16	29	**139**	2	0	0	**2**
1989	31	24	13	5	0	0	6	27	31	**137**	0	2	0	**2**
1990	30	21	14	3	0	0	6	19	28	**121**	2	0	7	**9**
1991	31	22	20	11	2	0	4	23	31	**144**	2	0	0	**2**
1992	31	23	15	3	0	0	2	28	29	**131**	0	0	1	**1**
1993	28	22	24	11	3	0	9	25	31	**153**	0	0	0	**0**
1994	30	24	14	8	0	0	4	22	28	**130**	0	0	0	**0**
1995	28	18	15	15	0	0	7	23	28	**134**	0	0	0	**0**
1996	31	23	21	11	0	2	9	24	28	**149**	0	0	0	**0**
1997	29	27	23	16	1	0	11	22	31	**160**	1	0	0	**1**
1998	31	23	20	17	1	0	4	22	30	**148**	0	0	0	**0**
1999	30	26	19	12	4	2	8	24	30	**156**	0	0	0	**0**
2000	25	23	24	5	1	0	1	24	29	**132**	0	0	0	**0**
2001	31	23	13	6	0	0	2	13	29	**117**	0	0	0	**0**
2002	31	28	23	2	0	0	4	25	31	**144**	0	0	0	**0**
2003	30	22	21	9	3	0	2	18	29	**134**	0	0	0	**0**
Mean	**29.4**	**24.0**	**20.0**	**10.0**	**1.3**	**0.2**	**5.9**	**21.0**	**29.5**	**139**	**1**	**0.2**	**0.4**	**1.3**

Table 6. Lowest temperatures (°F) recorded in each month at NMSU's Agricultural Science Center at Farmington, 1969-2003.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1969	9	12	13	27	37	44	**43***	52	46	26	14	7
1970	0	15	11	20	27	39	53	54	34	21	18	14
1971	**-18***	5	6	17	31	38	54	54	**28***	18	17	4
1972	2	2	14	24	30	47	56	54	37	22	15	2
1973	1	10	20	18	28	41	52	49	37	26	14	9
1974	-11	1	20	18	28	38	53	52	33	30	14	1
1975	-2	9	9	19	**23***	38	55	49	40	20	7	6
1976	-4	12	11	23	34	38	54	52	42	22	**1***	9
1977	-2	13	12	21	33	51	57	54	46	32	20	10
1978	12	0	20	26	31	45	51	46	32	31	18	-9
1979	-8	5	17	**16***	29	36	51	51	42	23	6	9
1980	14	18	13	18	27	36	53	**41***	37	17	12	11
1981	10	11	21	19	32	36	44	49	42	21	13	4
1982	-1	-3	19	22	30	38	47	54	38	21	17	6
1983	9	20	22	20	27	36	61	55	30	35	11	10
1984	2	11	14	18	27	40	53	54	39	23	15	13
1985	6	-1	13	28	29	39	53	51	31	31	8	8
1986	8	8	19	23	33	42	53	52	40	28	16	8
1987	2	8	9	24	35	43	50	47	40	32	14	1
1988	-2	16	9	21	30	38	54	54	33	36	12	1
1989	4	**-14***	14	29	36	41	55	48	36	**15***	9	3
1990	0	4	19	30	39	47	55	52	45	26	16	**-16***
1991	-3	12	17	24	30	39	53	54	39	20	11	3
1992	10	17	20	30	40	41	47	48	37	28	7	-2
1993	10	18	18	24	32	39	49	52	38	17	8	8
1994	7	4	12	26	35	46	50	57	39	26	8	11
1995	12	21	18	24	34	38	45	55	36	24	13	9
1996	6	12	16	20	39	41	54	52	29	16	19	3
1997	-1	13	13	19	26	46	51	53	43	19	17	8
1998	12	15	13	25	31	40	59	52	46	27	16	3
1999	11	7	21	20	30	**32***	50	49	**28***	19	9	3
2000	1	14	17	28	29	44	52	52	33	32	10	11
2001	10	8	21	24	34	36	57	52	36	28	13	8
2002	3	6	**3***	27	35	48	56	50	39	30	19	8
2003	17	8	22	24	29	46	53	57	41	28	12	7

*Lowest recorded monthly temperature.

Table 7. Highest temperatures (°F) recorded in each month at NMSU's Agricultural Science Center at Farmington, 1969-2003.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1969	57	61	74	82	89	96	96	**99***	95	78	63	56
1970	56	65	65	72	86	98	98	**99***	90	76	64	61
1971	60	64	77	77	84	97	101	91	90	67	70	57
1972	61	66	76	78	86	94	100	98	89	82	57	52
1973	47	61	63	76	85	98	99	97	88	81	73	65
1974	45	60	72	75	93	99	95	94	93	83	64	56
1975	61	58	65	77	85	96	95	95	89	84	73	57
1976	54	68	71	77	86	96	100	93	94	78	70	55
1977	46	65	69	81	91	98	97	98	93	82	74	63
1978	53	59	79	77	88	95	95	94	90	83	67	47
1979	46	60	62	78	82	96	97	96	94	83	60	54
1980	55	64	67	81	86	99	97	97	88	84	73	63
1981	60	67	71	82	84	**100***	97	96	85	78	68	56
1982	60	64	64	75	75	93	97	95	91	79	64	53
1983	53	68	68	83	89	92	96	**99***	93	74	70	50
1984	51	60	68	79	93	94	95	93	89	75	68	54
1985	50	60	70	79	85	95	100	95	93	75	68	51
1986	64	**70***	75	79	85	94	96	96	88	75	63	55
1987	56	61	69	80	82	93	98	93	89	83	66	58
1988	49	62	77	78	87	99	96	93	93	83	70	56
1989	50	67	**81***	85	90	98	**103***	92	91	85	67	53
1990	56	64	74	80	86	**100***	**103***	94	93	79	69	55
1991	44	58	67	79	85	94	97	93	91	82	67	46
1992	52	58	67	**86***	85	92	95	95	89	83	61	49
1993	54	61	72	81	86	96	96	96	88	84	61	56
1994	58	63	74	81	90	**100***	98	97	89	80	70	55
1995	53	68	74	77	82	92	101	97	**97***	83	68	64
1996	56	65	71	82	90	93	96	96	90	83	66	57
1997	58	60	75	76	88	93	98	92	91	84	68	54
1998	56	62	77	80	87	99	100	95	90	85	67	60
1999	62	65	75	78	85	94	99	91	89	85	**75***	**67***
2000	**66***	66	70	85	**97***	94	97	97	93	83	57	55
2001	51	62	70	81	90	96	99	94	93	86	**75***	59
2002	59	63	74	81	95	98	100	**99***	90	77	63	55
2003	57	59	74	78	95	96	**103***	98	92	**87***	67	62

*Highest recorded monthly temperature.

Table 8. Total monthly precipitation depth (inches) recorded at NMSU's Agricultural Science Center at Farmington, 1969-2003.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1969	0.85	0.31	0.21	0.30	1.13	**1.00***	0.69	0.47	2.07	2.88	0.38	0.29	10.58
1970	0.06	0.03	0.49	0.60	0.11	0.81	0.68	0.02	2.48	0.48	0.46	0.20	6.42
1971	0.18	0.09	0.05	0.11	0.41	0.00	0.31	1.72	1.06	1.15	0.77	0.16	6.01
1972	0.03	T	0.03	0.00	0.02	0.18	0.04	1.34	0.57	**3.53***	0.19	0.93	6.86
1973	0.28	0.17	1.82	1.54	0.65	0.95	0.27	0.61	1.49	0.35	0.30	0.37	8.80
1974	1.10	0.13	0.01	0.20	0.02	0.09	1.48	0.12	0.37	2.39	0.48	0.38	6.77
1975	0.11	0.61	1.52	0.78	0.35	0.13	0.84	0.24	0.80	0.14	0.22	0.20	5.94
1976	0.06	0.16	0.00	0.10	0.41	0.09	0.62	0.80	1.31	0.01	0.01	T	**3.57****
1977	0.42	T	0.00	0.01	0.29	0.04	1.01	1.41	0.38	0.30	0.62	0.63	5.11
1978	0.90	0.64	1.27	0.71	0.96	0.00	0.07	0.18	1.55	1.46	2.24	0.59	10.57
1979	0.88	0.19	0.46	0.28	0.58	0.43	1.40	0.49	0.08	1.37	0.97	0.73	7.86
1980	1.45	0.70	0.63	0.25	0.25	0.07	0.08	0.89	1.05	0.84	0.02	T	6.23
1981	T	0.30	1.76	0.21	1.05	0.16	1.34	0.35	0.69	0.89	0.36	0.03	7.14
1982	0.32	0.77	1.18	0.67	0.82	0.00	1.27	2.78	1.50	0.16	0.92	0.76	11.15
1983	0.94	0.69	1.84	0.31	0.13	0.35	1.67	0.72	0.53	0.52	0.91	0.67	9.28
1984	T	0.12	0.54	1.00	T	0.67	0.62	1.64	0.45	1.13	0.23	0.87	7.27
1985	0.39	0.13	1.74	1.76	0.29	0.01	1.38	0.43	1.31	1.21	0.52	0.22	9.39
1986	0.11	0.77	0.51	0.97	0.13	0.81	**4.10***	0.93	2.18	0.65	**2.73***	0.76	**14.65***
1987	0.10	**1.75***	0.66	T	0.68	0.02	0.28	1.17	0.27	1.07	1.65	0.59	8.24
1988	0.63	0.82	0.02	0.72	1.11	0.33	0.58	2.34	0.27	0.22	0.78	0.19	8.01
1989	1.19	0.56	0.06	0.00	T	T	1.24	1.62	0.14	0.51	0.00	T	5.32
1990	0.53	0.53	0.74	0.85	1.07	0.07	0.35	1.32	1.97	1.12	0.78	0.59	9.92
1991	0.59	0.26	0.67	0.01	0.27	0.69	0.35	0.58	1.38	0.38	2.07	**1.01***	8.26
1992	0.15	0.18	0.74	0.25	**1.75***	0.05	0.98	1.25	0.85	0.42	0.31	0.63	7.56
1993	**2.05***	0.82	0.93	0.28	0.38	0.04	0.03	2.06	0.84	1.25	0.47	0.15	9.30
1994	0.09	0.48	0.24	0.57	1.32	0.07	0.20	0.66	1.37	1.18	0.96	0.64	7.78
1995	0.57	0.14	1.45	1.28	0.90	0.03	0.23	1.88	2.04	0.10	0.14	0.39	9.15
1996	0.09	0.43	0.28	0.17	0.00	0.64	0.24	1.07	0.63	2.21	0.72	0.22	6.70
1997	1.03	0.48	0.03	**2.88***	0.82	0.62	1.28	1.12	2.68	0.43	0.67	0.80	12.84
1998	0.12	0.61	0.65	0.73	0.03	0.02	1.38	1.48	0.68	2.07	1.27	0.06	9.10
1999	0.14	0.05	0.13	1.21	1.26	0.44	2.51	**2.99***	0.25	0.01	0.06	0.12	9.17
2000	0.62	0.25	**2.05***	0.21	0.03	0.12	0.80	1.22	0.50	2.16	0.78	0.22	8.96
2001	0.44	0.80	1.37	0.67	0.87	0.03	0.82	1.01	0.26	0.24	0.48	0.55	7.54
2002	0.04	0.04	0.17	0.37	0.00	0.00	0.42	0.32	**3.26***	1.75	0.72	0.60	7.69
2003	0.08	1.29	0.49	0.02	0.01	0.15	0.11	1.24	0.87	0.72	1.03	0.31	6.32
Mean	**0.47**	**0.44**	**0.71**	**0.57**	**0.52**	**0.26**	**0.85**	**1.10**	**1.09**	**1.01**	**0.72**	**0.42**	**8.16**

*Highest recorded precipitation for month (or year) in 35-year period.

**Lowest recorded precipitation for year in 35-year period.

T - Trace

Table 9. Average daily wind run (miles/day) measured at two heights (2 feet and 6 feet) during each month at NMSU's Agricultural Science Center at Farmington, 1980-2003.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
						2 feet (6 inches above evaporation pan)							
1980	64	66	100	97	80	57	44	41	27	30	23	14	**53.6**
1981	50	80	94	85	71	64	58	60	20	55	56	52	**62.1**
1982	69	36	63	89	78	42	59	75	77	86	77	89	**70.0**
1983	82	101	107	101	108	98	76	70	62	73	94	98	**89.2**
1984	63	101	104	114	78	94	66	61	70	71	99	67	**82.3**
1985	49	87	128	98	76	66	70	76	70	72	148	55	**82.9**
1986	53	61	72	95	78	64	52	66	60	45	50	45	**61.8**
1987	60	41	50	50	31	22	25	19	21	48	71	79	**43.1**
1988	76	73	99	88	99	81	75	71	75	64	82	82	**80.4**
1989	84	75	96	86	69	73	78	72	73	68	68	59	**75.1**
1990	78	97	90	91	91	84	82	82	76	72	71	83	**83.1**
1991	61	73	106	98	99	75	79	67	72	57	59	47	**74.4**
1992	64	66	80	76	72	74	66	70	62	58	68	66	**68.5**
1993	103	86	105	107	91	81	71	75	74	65	82	79	**84.9**
1994	81	96	83	94	71	61	72	72	63	58	84	59	**74.5**
1995	76	65	83	81	80	61	63	59	52	64	58	49	**65.9**
1996	92	79	88	93	72	73	72	60	44	51	53	71	**70.7**
1997	43	79	78	73	70	62	55	48	50	48	39	35	**56.8**
1998	59	75	83	81	66	72	70	66	62	78	66	59	**69.5**
1999	76	74	83	109	95	70	63	63	61	65	73	78	**75.8**
2000	83	88	93	93	85	80	66	64	62	63	60	57	**74.5**
2001	65	74	72	91	83	77	64	67	74	74	65	75	**73.4**
2002	74	90	104	83	59	64	69	55	62	50	56	49	**67.9**
2003	36	58	60	68	70	70	56	60	56	50	56	62	**58.5**
Mean	**68.4**	**75.9**	**88.4**	**89.2**	**78.0**	**69.4**	**64.6**	**63.3**	**59.4**	**61.0**	**69.1**	**62.9**	**70.8**
						6 feet above ground							
1980	---	---	---	---	134	132	116	96	82	78	80	84	**---**
1981	112	124	141	124	102	81	62	82	71	81	76	58	**92.8**
1982	88	63	97	127	100	122	103	91	99	95	86	99	**97.5**
1983	111	139	147	154	141	120	116	102	113	107	130	136	**126.3**
1984	64	115	93	136	88	96	52	46	49	44	136	110	**85.7**
1985	95	127	183	155	142	136	136	133	125	127	72	117	**129.0**
1986	113	129	145	179	154	139	128	134	128	118	116	99	**131.9**
1987	139	131	143	158	139	126	122	119	132	108	123	117	**129.7**
1988	121	122	163	148	166	138	132	126	120	91	98	98	**126.8**
1989	97	133	151	147	132	123	126	120	125	115	112	104	**123.8**
1990	125	152	146	170	165	154	141	136	127	135	127	130	**142.2**
1991	101	120	190	191	167	138	140	119	129	111	109	85	**133.4**
1992	117	119	137	142	133	137	118	118	111	110	113	106	**121.6**
1993	164	139	153	171	144	86	57	80	103	87	92	---	**---**
1994	130	156	144	166	135	130	136	127	120	119	154	115	**136.0**
1995	137	129	147	176	185	137	128	118	115	137	129	100	**136.5**
1996	171	145	161	182	149	140	127	119	112	134	119	147	**142.3**
1997	106	149	146	153	137	113	112	101	105	115	118	110	**122.1**
1998	100	133	145	144	112	120	111	100	105	131	111	106	**118.2**
1999	143	142	145	186	196	92	85	100	107	98	93	126	**126.1**
2000	132	141	149	158	144	135	108	104	108	110	113	109	**125.9**
2001	116	127	173	147	141	128	106	108	121	125	110	132	**127.8**
2002	117	144	163	134	126	115	114	96	108	90	110	107	**118.7**
2003	98	134	143	139	134	128	106	107	113	103	116	129	**120.8**
Mean	**117.3**	**131.0**	**148.0**	**156.0**	**140.3**	**123.6**	**111.8**	**107.6**	**109.5**	**107.0**	**110.1**	**109.7**	**123.4**

Table 10. Average daily solar radiation (gram cal/cm2 or Langleys) at NMSU's Agricultural Science Center at Farmington, 1977-2003.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
1977	204	305	386	552	438	530	501	464	396	360	---	---	**413.6**
1978	157	168	334	459	490	586	641	491	401	292	185	166	**364.2**
1979	166	261	302	423	445	527	489	477	459	267	165	155	**344.7**
1980	141	192	300	429	459	529	595	501	436	342	280	145	**362.4**
1981	190	296	292	473	499	607	550	489	422	314	248	200	**381.7**
1982	129	207	369	536	594	707	651	565	470	393	227	208	**421.3**
1983	188	294	345	518	654	734	793	725	583	332	230	176	**464.3**
1984	250	345	486	540	688	494	736	744	595	317	226	188	**467.4**
1985	242	303	359	499	561	648	590	561	413	335	228	214	**412.8**
1986	243	304	410	468	586	573	549	509	352	313	215	205	**393.9**
1987	229	289	411	566	551	665	638	542	483	352	246	197	**430.8**
1988	220	305	474	496	626	623	621	555	486	470	251	216	**445.3**
1989	224	280	419	550	628	633	619	570	498	361	277	219	**439.8**
1990	222	282	316	479	593	662	620	541	462	361	234	203	**414.6**
1991	212	309	356	554	651	556	613	537	450	340	249	146	**414.4**
1992	189	268	358	509	530	616	560	501	451	324	238	167	**392.6**
1993	160	230	374	514	532	599	614	464	456	331	240	187	**391.8**
1994	223	262	371	439	482	564	555	496	411	300	225	178	**375.5**
1995	189	288	358	438	481	552	520	459	373	324	212	157	**362.6**
1996	240	309	463	580	651	609	676	604	458	357	250	226	**451.9**
1997	215	314	516	513	613	657	640	567	491	390	267	220	**450.3**
1998	236	260	443	563	661	725	604	565	506	331	266	244	**450.3**
1999	263	363	458	527	624	702	584	515	505	438	320	241	**461.7**
2000	251	305	399	581	689	696	673	579	479	325	255	213	**453.8**
2001	241	322	424	508	672	766	633	580	541	396	286	248	**468.1**
2002	251	383	492	593	710	742	663	601	479	372	294	219	**483.3**
2003	249	315	452	596	640	719	692	604	510	401	200	203	**465.1**
Mean	**212.0**	**287.4**	**395.1**	**514.9**	**583.3**	**630.4**	**615.6**	**548.4**	**465.4**	**349.6**	**242.8**	**197.7**	**421.4**

Table 11. Total monthly evaporation (inches) from a Class-A pan at NMSU's Agricultural Science Center at Farmington, 1972-2003.

Year	Apr.	May	June	July	Aug.	Sept.	Oct.	Total*
1972	---	---	---	14.82	11.81	9.57	4.40	**---**
1973	---	---	11.1	11.53	10.66	9.57	---	**---**
1974	---	12.99	15.36	12.87	12.25	9.33	4.59	**62.8**
1975	---	9.27	12.03	12.28	12.49	8.10	7.50	**54.2**
1976	---	11.78	15.45	13.76	13.11	9.06	5.89	**63.2**
1977	9.12	12.28	14.94	13.11	12.21	9.51	6.60	**62.1**
1978	9.30	9.64	12.81	14.54	13.08	9.63	7.97	**59.7**
1979	8.34	8.62	10.86	10.97	10.60	9.51	---	**50.6**
1980	7.74	9.98	14.67	14.01	12.59	8.16	---	**59.4**
1981	7.62	9.21	14.10	12.03	11.25	7.65	---	**54.2**
1982	---	10.01	12.81	12.14	9.73	7.28	---	**52.0**
1983	---	10.00	11.51	12.51	11.06	8.72	---	**53.8**
1984	---	12.15	11.66	11.74	10.43	7.84	3.29	**53.8**
1985	---	8.74	12.27	12.68	11.61	6.99	4.44	**52.3**
1986	7.36	9.82	10.97	11.34	11.34	6.75	---	**50.2**
1987	---	6.64	11.47	12.19	10.39	8.23	3.12	**48.9**
1988	---	11.55	11.06	13.05	9.74	8.55	6.16	**54.0**
1989	---	12.18	12.54	13.83	11.04	9.37	---	**59.0**
1990	8.80	11.56	15.48	12.74	11.35	8.82	5.77	**60.0**
1991	8.68	11.68	10.99	12.77	11.11	8.53	---	**55.1**
1992	7.76	8.67	12.15	11.89	10.80	8.19	6.53	**51.7**
1993	9.66	10.52	13.94	14.78	10.17	9.11	5.57	**58.5**
1994	8.35	11.90	15.04	15.63	12.46	9.28	7.38	**64.3**
1995	7.48	9.78	12.72	13.81	11.63	9.74	7.48	**57.7**
1996	9.10	13.50	12.72	13.99	11.10	7.08	5.66	**58.4**
1997	7.37	9.33	11.84	12.36	9.59	7.78	5.80	**50.9**
1998	7.27	11.37	14.12	13.03	11.36	10.03	5.85	**59.9**
1999	8.31	10.75	13.12	11.75	8.68	8.21	7.45	**52.5**
2000	9.62	13.20	14.11	13.16	11.36	8.86	4.87	**60.7**
2001	8.45	11.35	13.92	12.57	10.93	10.85	7.29	**59.6**
2002	9.21	13.29	14.79	14.09	12.28	7.82	4.63	**62.3**
2003	8.22	11.58	14.80	15.63	12.32	9.33	6.58	**63.7**
Mean	**8.39**	**10.78**	**13.08**	**13.02**	**11.27**	**8.66**	**5.86**	**56.8**

*Total from May through September.

Table 12. Average daily evaporation (inches) in each month from a Class-A pan at NMSU's Agricultural Science Center at Farmington, 1972-2003.

Year	Apr.	May	June	July	Aug.	Sept.	Oct.	Mean*
1972	---	---	---	0.478	0.381	0.319	0.142	**---**
1973	---	---	0.370	0.372	0.344	0.319	---	**---**
1974	---	0.419	0.512	0.415	0.395	0.311	0.148	**0.410**
1975	---	0.299	0.401	0.396	0.403	0.270	0.242	**0.354**
1976	---	0.380	0.515	0.444	0.423	0.302	0.190	**0.413**
1977	0.304	0.396	0.498	0.423	0.394	0.317	0.213	**0.406**
1978	0.310	0.311	0.427	0.469	0.422	0.321	0.257	**0.390**
1979	0.278	0.278	0.362	0.354	0.342	0.317	---	**0.331**
1980	0.258	0.322	0.489	0.452	0.406	0.272	---	**0.388**
1981	0.254	0.297	0.470	0.388	0.363	0.255	---	**0.355**
1982	---	0.323	0.427	0.392	0.314	0.243	---	**0.340**
1983	---	0.323	0.384	0.404	0.357	0.291	---	**0.351**
1984	---	0.392	0.389	0.379	0.336	0.261	0.106	**0.351**
1985	---	0.282	0.409	0.409	0.375	0.233	0.143	**0.341**
1986	0.245	0.317	0.366	0.366	0.366	0.225	---	**0.328**
1987	---	0.214	0.382	0.393	0.335	0.274	0.101	**0.320**
1988	---	0.373	0.369	0.421	0.314	0.285	0.199	**0.352**
1989	---	0.393	0.418	0.446	0.356	0.312	---	**0.385**
1990	0.293	0.373	0.516	0.411	0.366	0.294	0.186	**0.392**
1991	0.289	0.377	0.366	0.412	0.358	0.284	---	**0.360**
1992	0.259	0.280	0.405	0.384	0.348	0.273	0.211	**0.338**
1993	0.322	0.339	0.465	0.477	0.328	0.304	0.180	**0.383**
1994	0.278	0.384	0.501	0.504	0.402	0.309	0.238	**0.420**
1995	0.249	0.315	0.424	0.445	0.375	0.325	0.241	**0.377**
1996	0.303	0.435	0.424	0.451	0.358	0.236	0.183	**0.381**
1997	0.246	0.301	0.395	0.399	0.309	0.259	0.187	**0.333**
1998	0.242	0.367	0.471	0.420	0.366	0.334	0.189	**0.392**
1999	0.277	0.347	0.437	0.379	0.280	0.274	0.240	**0.343**
2000	0.321	0.426	0.470	0.425	0.366	0.295	0.157	**0.397**
2001	0.282	0.366	0.464	0.405	0.353	0.362	0.235	**0.388**
2002	0.307	0.429	0.493	0.455	0.396	0.261	0.149	**0.407**
2003	0.274	0.374	0.493	0.504	0.397	0.311	0.212	**0.416**
Mean	**0.280**	**0.348**	**0.436**	**0.420**	**0.363**	**0.289**	**0.189**	**0.371**

*Mean daily evaporation from May through September.

Table 13. Average soil temperature (ºF) 4 inches below the surface at NMSU's Agricultural Science Center at Farmington, 1976-2003.

Month	Mean High	Mean Low	Mean*	Mean Extreme High	Mean Extreme Low
January	35.5	31.3	33.4	41.6	25.6
February	42.8	34.8	38.8	53.1	29.6
March	54.3	40.9	47.6	64.1	34.6
April	66.1	49.5	57.8	77.1	40.1
May	78.0	59.5	68.8	88.2	48.6
June	89.3	70.2	79.8	96.6	62.1
July	95.3	75.7	85.5	101.0	68.7
August	92.9	73.5	83.2	99.0	66.1
September	83.7	65.6	74.7	93.5	56.2
October	67.3	51.9	59.6	79.0	41.9
November	49.0	39.2	44.1	59.5	32.1
December	36.9	32.2	34.6	45.9	27.0
Mean	**65.9**	**52.0**	**59.0**	**74.9**	**44.4**

*Average of mean high and low.

Table 14. Soil low temperature (°F) extremes in each month four inches below the bare surface at NMSU's Agricultural Science Center at Farmington, 1976-2003.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1976	---	---	---	---	---	---	---	---	53	39	36	18
1977	6	22	24	32	52	73	70	73	62	43	31	20
1978	31	34	37	49	44	68	75	70	52	44	38	27
1979	19	30	38	39	49	62	70	69	68	44	32	31
1980	36	38	40	40	54	63	72	68	61	41	37	35
1981	33	31	39	40	52	56	67	71	62	43	36	28
1982	22	29	35	43	47	63	72	68	57	40	37	30
1983	26	34	38	39	47	60	64	65	58	49	33	30
1984	23	32	32	38	42	56	69	65	53	34	30	30
1985	29	22	35	37	45	60	66	64	47	41	31	24
1986	29	29	35	37	49	62	60	62	48	37	31	33
1987	28	32	31	36	41	65	75	71	61	50	38	37
1988	32	34	38	44	45	53	68	66	56	49	31	26
1989	20	33	35	45	53	65	63	65	60	38	30	24
1990	23	26	33	43	47	59	71	63	55	42	35	28
1991	23	25	37	43	50	56	71	68	58	40	35	34
1992	28	35	40	46	54	62	66	62	59	50	27	26
1993	30	34	36	39	45	63	71	57	49	34	26	22
1994	24	20	33	38	51	64	70	65	53	37	26	26
1995	28	29	34	38	45	59	62	66	---	42	31	20
1996	22	26	32	41	54	58	58	57	44	37	35	31
1997	27	33	34	38	46	---	---	68	57	35	32	22
1998	22	31	31	37	54	64	68	65	63	41	33	24
1999	30	29	37	40	42	63	72	67	56	48	32	25
2000	25	32	35	40	57	64	71	68	58	44	30	28
2001	24	25	35	41	46	62	69	66	63	46	27	24
2002	23	25	28	41	51	69	72	66	51	39	32	30
2003	27	30	33	40	50	65	73	70	54	45	26	24
Mean	**25.6**	**29.6**	**34.6**	**40.1**	**48.6**	**62.1**	**68.7**	**66.1**	**56.2**	**41.9**	**32.1**	**27.0**

Table 15. Soil high temperature (°F) extremes in each month four inches below the bare surface at NMSU's Agricultural Science Center at Farmington, 1976-2003.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1976	---	---	---	---	---	---	---	---	107	80	64	46
1977	44	57	68	95	106	117	117	112	103	90	67	53
1978	45	51	60	88	95	108	112	110	105	86	68	45
1979	40	53	64	80	91	101	107	107	100	89	63	44
1980	38	62	65	79	89	104	106	106	92	84	65	55
1981	52	61	69	86	88	95	98	95	88	76	58	45
1982	44	53	57	78	88	99	102	99	94	78	56	47
1983	39	53	60	71	88	91	97	97	92	74	64	43
1984	37	45	62	68	91	92	97	102	94	76	61	47
1985	45	54	63	76	90	100	108	101	103	77	66	49
1986	50	59	70	78	86	97	101	102	96	72	54	44
1987	37	54	56	77	87	93	99	97	96	80	63	49
1988	36	57	68	75	88	99	98	97	91	79	66	43
1989	35	57	69	76	85	94	100	98	90	80	59	44
1990	44	55	66	75	84	95	97	94	92	78	61	45
1991	37	50	61	76	86	94	100	99	95	85	60	42
1992	38	53	60	79	85	95	96	98	88	82	53	37
1993	42	52	67	77	89	92	99	100	88	77	53	42
1994	45	52	65	80	86	95	98	99	92	75	57	43
1995	41	60	65	72	79	90	98	99	---	70	60	50
1996	42	55	65	77	91	96	100	92	91	78	54	48
1997	45	49	64	69	84	---	---	95	91	81	57	47
1998	39	48	64	74	90	98	102	96	90	79	54	49
1999	44	50	65	72	80	95	99	92	86	73	57	48
2000	47	49	64	78	89	92	95	94	86	76	50	42
2001	32	47	63	78	86	93	100	96	90	83	62	47
2002	39	48	67	75	90	95	99	97	90	75	56	45
2003	45	49	63	74	90	91	100	99	95	79	59	45
Mean	**41.6**	**53.1**	**64.1**	**77.1**	**88.2**	**96.6**	**101.0**	**99.0**	**93.5**	**79.0**	**59.5**	**45.9**

Table 16. Total monthly growing degree-days* from May through September and to the first fall frost (32oF) at NMSU's Agricultural Science Center at Farmington, 1969-2003.

Year	May	June	July	Aug.	Sept.	Total through Sept.	Total through 1st Frost	Date of 1st Frost
1969	434	510	729	744	570	2,987	3,017	Oct. 5
1970	434	555	744	744	420	2,897	2,949	Oct. 8
1971	372	600	729	713	450	2,864	2,684	Sept. 18
1972	434	615	744	713	495	3,001	3,201	Oct. 30
1973	372	640	713	713	435	2,873	2,990	Oct. 11
1974	465	645	729	698	450	2,987	3,227	Oct. 30
1975	326	525	713	667	435	2,666	2,806	Oct. 14
1976	403	585	744	698	495	2,925	2,978	Oct. 7
1977	372	675	744	729	540	3,060	3,386	Oct. 31
1978	310	570	729	667	450	2,726	2,576	Sept. 20
1979	341	510	682	667	555	2,755	2,986	Oct. 22
1980	341	570	698	682	450	2,741	2,869	Oct. 16
1981	372	600	682	651	450	2,755	2,875	Oct. 16
1982	341	525	682	698	450	2,696	2,741	Oct. 6
1983	341	495	682	729	525	2,772	2,615	Sept. 21
1984	465	555	729	713	480	2,942	3,017	Oct. 15
1985	397	600	710	692	416	2,815	2,926	Sept. 30
1986	377	574	661	693	395	2,700	2,790	Oct. 12
1987	366	592	674	646	473	2,751	2,873	Oct. 19
1988	396	607	722	697	476	2,898	2,981	Nov. 12
1989	468	565	731	670	540	2,974	3,131	Oct. 18
1990	378	635	729	673	532	2,947	3,029	Oct. 9
1991	409	557	704	701	471	2,842	3,153	Oct. 28
1992	385	536	630	639	484	2,674	2,763	Oct. 8
1993	416	538	652	615	454	2,675	2,854	Oct. 19
1994	426	628	729	746	495	3,024	3,169	Oct. 17
1995	330	516	676	729	494	2,745	2,782	Oct. 6
1996	477	612	730	695	410	2,924	2,785	Sept. 19
1997	441	563	685	670	568	2,927	3,081	Oct. 13
1998	417	499	746	716	560	2,938	2,984	Oct. 6
1999	364	554	710	655	451	2,734	2,702	Sept. 28
2000	479	640	665	663	536	2,983	3,117	Oct. 14
2001	465	591	751	691	578	3,076	3,214	Oct. 11
2002	446	625	739	674	486	2,973	3,004	Oct. 4
2003	453	586	763	730	485	3,017	3,329	Oct. 27
Mean	**400**	**577**	**711**	**692**	**484**	**2,865**	**2,960**	**Oct. 13**

*Growing degree-days/month = Σ (Average daily temperature between COmax and COmin minus base)

- CO(max) = 86°F
- CO(min) = 50°F
- base = 50°F

Refer to text for detailed explanation.

Table 17. Average total and average daily reference evapotranspiration* (ETo) during each month at NMSU's Agricultural Science Center at Farmington, 1996-2003.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
							Total Monthly ETo						
1996	2.88	3.61	6.11	8.32	11.10	10.39	11.46	9.08	6.76	5.45	2.92	2.26	**80.3**
1997	1.69	3.20	7.26	6.50	9.12	10.54	10.55	7.17	7.14	5.81	3.28	2.06	**74.3**
1998	2.37	2.47	5.52	7.24	10.25	11.58	10.44	9.48	8.25	5.05	3.13	2.60	**78.4**
1999	3.36	4.36	7.27	7.29	9.62	11.43	10.16	7.93	7.59	7.02	4.83	2.66	**83.5**
2000	2.81	3.70	5.23	8.53	11.30	11.72	---	---	7.93	4.75	2.42	2.26	**---**
2001	2.17	3.11	---	---	---	10.35	10.30	10.19	8.75	6.20	3.44	2.54	**---**
2002	2.73	4.04	6.69	9.03	11.16	12.59	11.52	9.52	7.18	4.75	3.20	2.00	**84.4**
2003	2.42	3.03	5.51	8.36	10.12	11.70	12.20	8.90	7.87	5.98	2.55	2.33	**81.0**
Mean	**2.55**	**3.44**	**6.23**	**7.90**	**10.38**	**11.29**	**10.95**	**8.90**	**7.68**	**5.63**	**3.22**	**2.34**	**80.5**
							Average Daily ETo						
1996	0.09	0.13	0.20	0.28	0.36	0.35	0.37	0.29	0.23	0.18	0.10	0.07	**0.22**
1997	0.05	0.11	0.23	0.22	0.29	0.35	0.34	0.23	0.24	0.19	0.11	0.07	**0.20**
1998	0.08	0.09	0.18	0.24	0.33	0.39	0.34	0.31	0.28	0.16	0.10	0.08	**0.21**
1999	0.11	0.16	0.23	0.24	0.31	0.38	0.33	0.26	0.25	0.23	0.16	0.09	**0.23**
2000	0.09	0.13	0.17	0.28	0.36	0.39	---	---	0.26	0.15	0.08	0.07	**0.20**
2001	0.07	0.11	---	---	---	0.35	0.33	0.33	0.29	0.20	0.11	0.08	**0.21**
2002	0.09	0.14	0.22	0.30	0.36	0.42	0.37	0.31	0.24	0.15	0.11	0.06	**0.23**
2003	0.08	0.11	0.18	0.28	0.33	0.39	0.39	0.29	0.26	0.19	0.09	0.08	**0.22**
Mean	**0.08**	**0.12**	**0.20**	**0.26**	**0.33**	**0.38**	**0.35**	**0.29**	**0.26**	**0.18**	**0.11**	**0.08**	**0.22**

*Modified FAO-24 Penman reference ET (grass based) from New Mexico Climate Center (NMCC) web site http://weather.nmsu.edu

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