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## G96-1281 Spring Freeze Probabilities

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## Spring Freeze Probabilities

**Spring freeze probabilities, based on 45 years of data, are examined for 48 locations in Nebraska. The effect of spring freezes on Nebraska's main crops is also discussed.**

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The potential of a late spring freeze is of great concern to farmers, gardeners, nurserymen, and other plant growers. A climatological analysis of spring freeze events across Nebraska can provide a measure of the risk involved with planting at a certain time of spring.

Freezes are generally classified as light, moderate, or heavy. A light freeze occurs when the minimum temperature falls within the range of 32°F to 29°F; a moderate freeze when the minimum temperature falls within the range of 28°F to 25°F; and a heavy freeze when the minimum temperature falls to 24°F or below.

Often, when minimum temperatures near freezing, other factors also should be considered in evaluating their effect on plants, including thermometer position and local topography.

**Thermometer Position.** Thermometers that record minimum temperature are positioned about 5 feet above the ground in ventilated boxes called instrument shelters. On clear, calm nights the temperature at ground level can be 5°F to 10°F colder than that measured in the instrument shelter because the heat near the earth's surface is being emitted to space. This is a great concern in spring when the newly germinated plants are small and susceptible to freezing temperatures.

**Local Topography.** Because cold air is more dense than warm air, the cold air will drain into depressions such as low spots between hills, gullies, and narrow river valleys. This often occurs on clear, calm nights.

### Effect of Spring Freeze on Individual Crops

Plant species, development stage, plant condition, timing of cultivation, intensity and duration of cold, and rate of freezing and thawing are factors that determine the severity of a freeze. The following discussion addresses critical freeze periods for Nebraska's main crops.

**Fall Seeded Grains and Spring Seeded Oats.** Early varieties of these crops may suffer damage from a

very late freeze of 28-30°F or lower that kills pollen and prevents fertilization.

**Corn and Sorghum.** Springtime soil temperatures at shallow depths are usually warmer than air temperatures on freeze days. A freeze after seedling emergence may damage corn leaves but is not likely to kill the plant because the growing point is below the soil, protected until plants are 6-12 inches tall. A freeze occurring after this time can severely damage the plant. Sorghum plants one to three weeks old have recovered from a freeze as low as 25°F, but well advanced crops can be damaged by temperatures slightly below freezing.

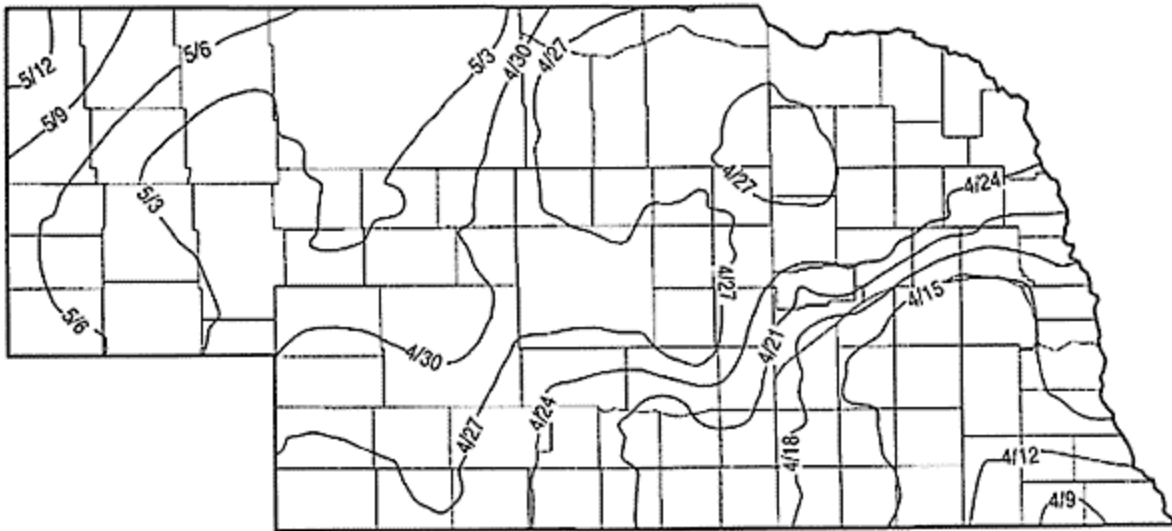
**Legumes.** The growing point of soybean, field bean, and alfalfa is above the ground and often damaged if planted too early. A freeze of 28°F or lower can seriously damage newly emerged beans. A freeze of 20°F or lower is needed to seriously damage alfalfa seedlings.

**Sugar Beet.** These plants are hardy and will germinate at low temperatures; however, they are sensitive to temperatures of 28°F or below when the hypocotyl is bent pulling the seed leaves from the soil.

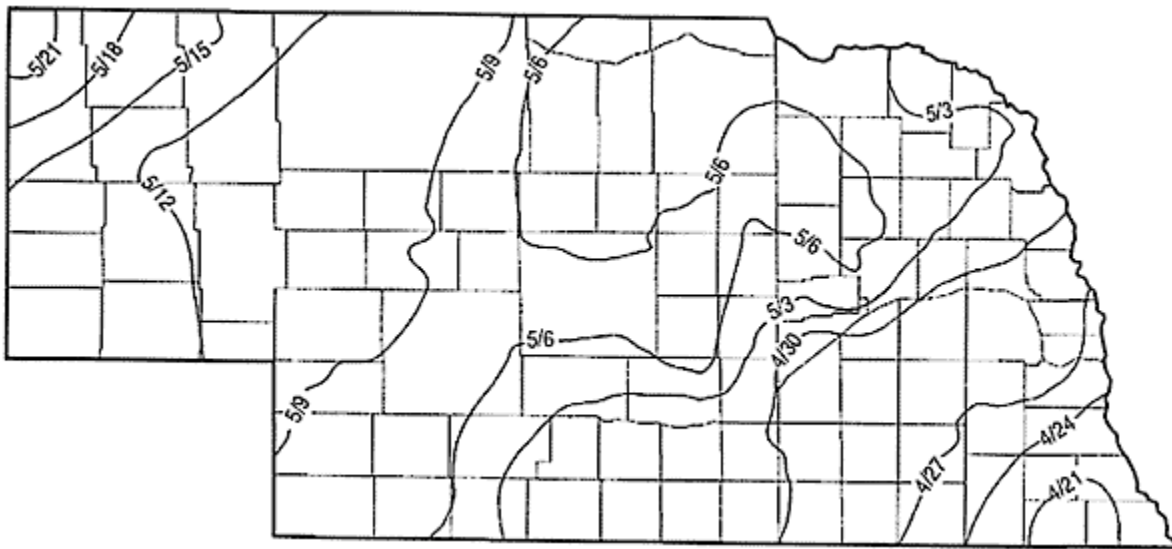
*Table I* shows the dates of the earliest, median (middle), and latest occurrence of the last spring freeze (32°F and 28°F) for 48 Nebraska locations. The dates in this table provide information regarding spring freeze extremes as well as the typical occurrence of spring's last freeze. For example, the earliest occurrence of the last light spring freeze (32°F) in Holdrege was on April 6; the latest occurrence was on May 29; and the median (typical) last freeze occurs on April 28. The earliest occurrence of the last moderate spring freeze (28°F) was on March 19; the latest occurrence was on May 13; and the median (typical) last freeze occurs on April 15.

*Figures 1-3* and *4-6* identify dates related to the last occurrence of a spring freeze (32° and 28°F, respectively). Each figure is based on 45 years of data, 1950-1994. The probability of the last spring freeze (32°F) occurring on or after the dates identified in *Figure 1* is 80 percent (i.e., a freeze on or after these dates is likely to occur in four out of five years). *Figure 2* identifies the median or "typical" date on which the last spring 32°F minimum temperature occurs. The probability of the last spring freeze (32°F) occurring on or after the dates identified in *Figure 3* is 20 percent (i.e., a freeze on or after these dates is likely to occur in one out of five years). The probability of the last spring freeze (28°F) occurring on or after the dates identified in *Figure 4* is 80 percent (i.e., a freeze on or after these dates is likely to occur in four out of five years). *Figure 5* identifies the median or "typical" date on which the last spring 28°F minimum temperature occurs. The probability of the last spring freeze (28°F) occurring on or after the dates identified in *Figure 6* is 20 percent (i.e., a freeze on or after these dates is likely to occur in one out of five years).

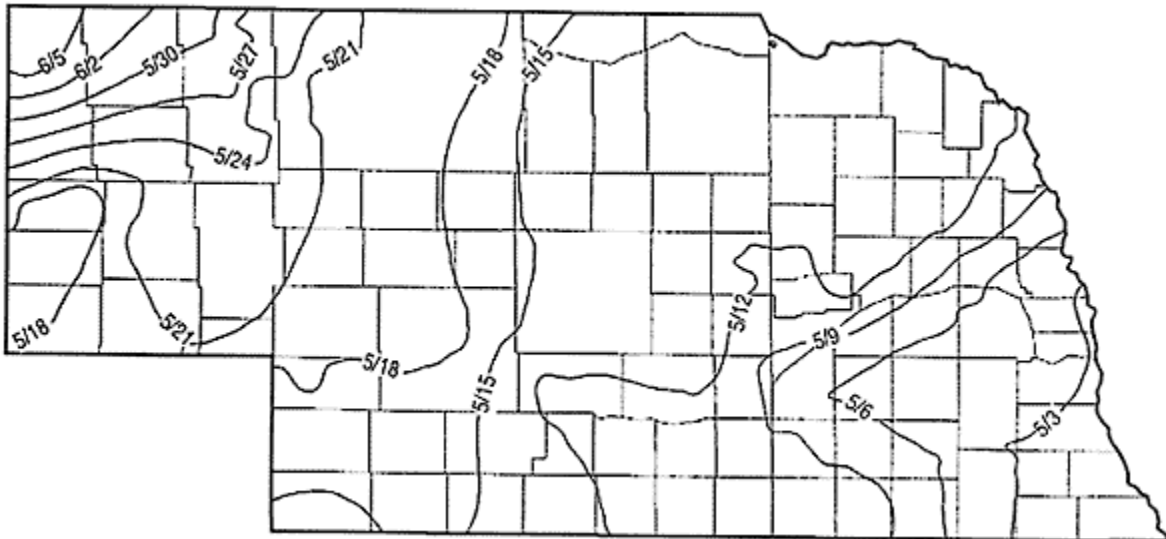
No one can predict when the last spring freeze will occur. However, the information provided here is intended to help producers to better assess the freeze risks associated with spring planting on a given date.



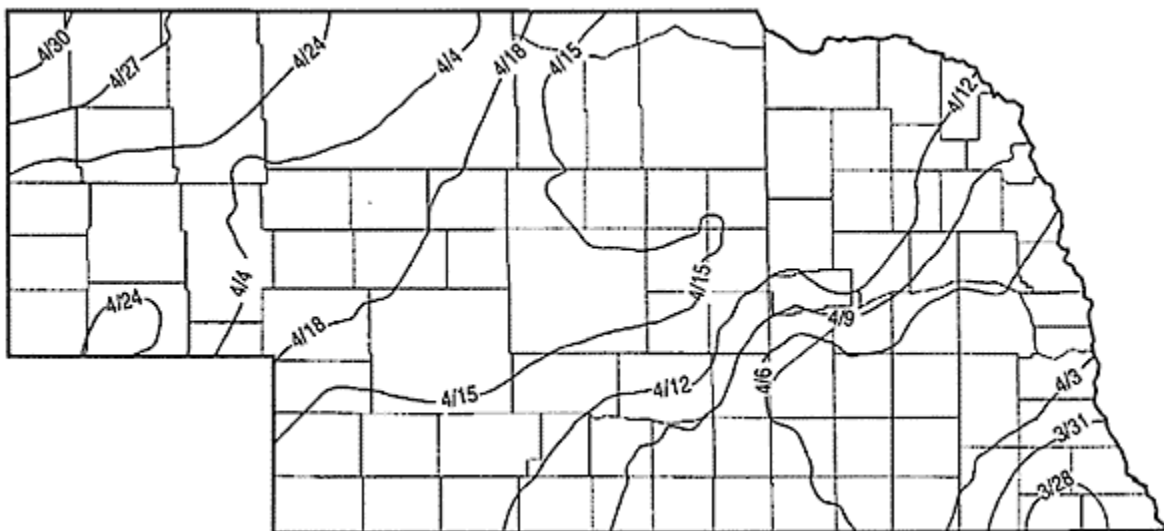
**Figure 1 (above). There is an 80 percent probability of a spring freeze (32°F) occurring on or after the dates shown on this map (based on 45 years of record, 1950-1994).**



**Figure 2 (above). Median spring freeze (32°F) date. Half of all spring freezes will occur before the dates shown on this map and half will occur after (based on 45 years of record, 1950-1994).**



**Figure 3 (above).** There is a 20 percent probability of a spring freeze (32°F) occurring on or after the dates shown on this map (based on 45 years of record, 1950-1994).



**Figure 4 (above).** There is an 80 percent probability of a spring freeze (28°F) occurring on or after the dates shown on this map (based on 45 years of record, 1950-1994).

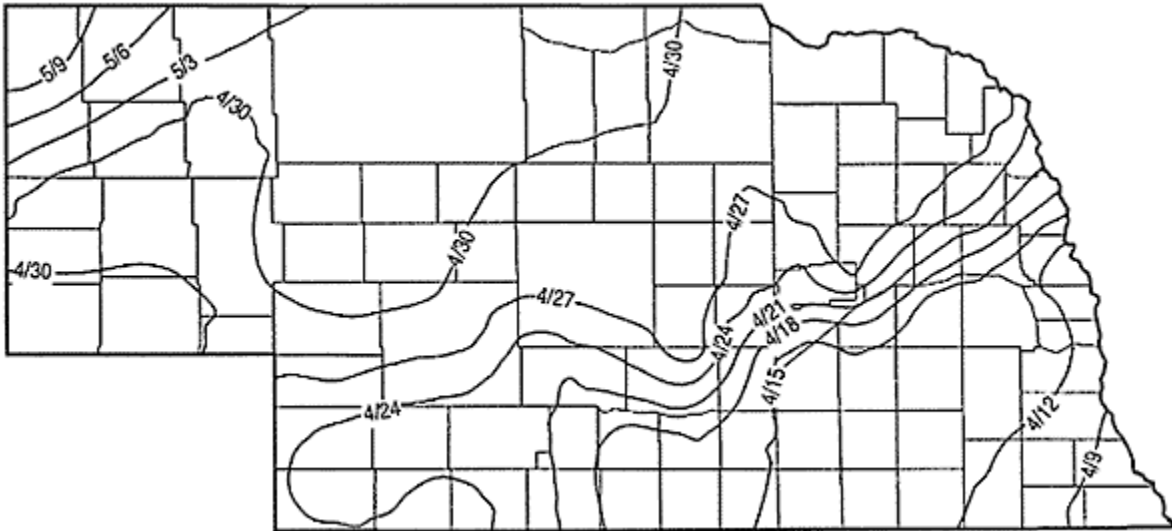


Figure 5 (above). Median spring freeze (28°F) date. Half of all spring freezes will occur before the dates shown on this map and half will occur after (based on 45 years of record, 1950-1994).

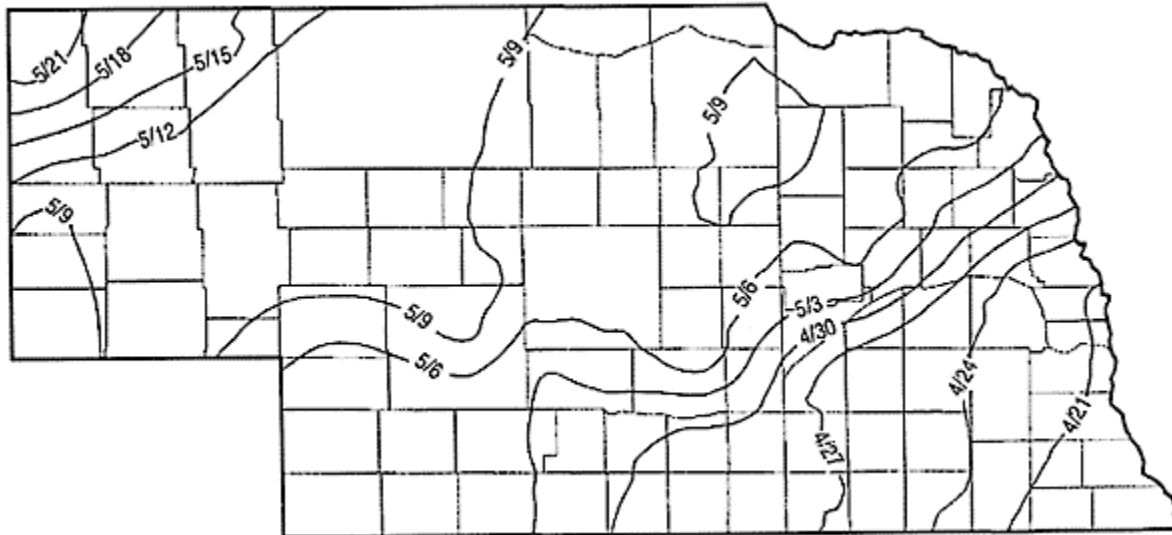


Figure 6 (above). There is a 20 percent probability of a spring freeze (28°F) occurring on or after the dates shown on this map (based on 45 years of record, 1950-1994).

Table I. Earliest, median, and latest date of the last occurrence of a light (32°F) and moderate (28°F) spring freeze for 48 locations in Nebraska.						
Location	Last Spring 32°F Minimum Temperature			Last Spring 28°F Minimum Temperature		
	Earliest	Median	Latest	Earliest	Median	Latest
Ainsworth	4/14	5/3	5/31	3/30	4/24	5/22
Albion	4/12	5/6	5/29	4/1	4/28	5/29
Alliance	4/10	5/11	6/14	4/2	4/28	6/2

Arthur	4/23	5/11	6/14	4/9	5/3	5/26
Ashland	3/31	4/30	5/22	3/24	4/15	5/3
Atkinson	4/4	5/4	5/29	3/30	4/25	5/29
Benkelman	4/11	5/7	5/27	4/4	4/24	5/26
Blair	4/6	4/28	5/15	3/23	4/11	5/3
Bridgeport	4/21	5/14	6/16	4/5	4/29	6/2
Broken Bow	4/13	5/12	6/2	4/1	5/3	5/30
Cambridge	4/14	5/1	5/29	3/30	4/23	5/15
Central City	4/5	4/28	5/29	3/20	4/15	5/29
Crete	3/30	4/27	5/14	3/18	4/13	5/14
Culbertson	4/14	5/7	6/2	3/30	4/25	5/29
David City	3/24	4/27	5/29	3/21	4/13	5/15
Ewing	4/12	5/8	6/1	3/30	4/29	5/22
Fairbury	3/30	4/26	5/29	3/8	4/13	5/15
Falls City	3/24	4/22	5/9	3/16	4/8	4/26
Franklin	4/1	5/1	5/28	3/23	4/16	5/27
Fremont	4/6	4/29	5/22	3/23	4/13	5/3
Genoa	4/7	5/6	5/22	4/5	4/28	5/22
Gothenburg	4/10	5/5	5/29	4/1	4/22	5/29
Grand Island	4/5	4/30	5/29	3/20	4/15	5/29
Harrison	4/22	5/22	6/30	4/10	5/12	6/15
Hayes Center	4/7	5/1	5/26	3/31	4/21	5/14
Hebron	4/5	4/29	5/22	3/23	4/14	5/14
Holdrege	4/6	4/28	5/29	3/19	4/15	5/13
Imperial	4/14	5/2	5/27	4/4	4/23	5/13
Kearney	4/6	4/30	5/29	3/30	4/21	5/14
Kimball	4/19	5/13	6/14	4/4	5/1	6/3
Lincoln	3/27	4/27	5/29	3/7	4/15	5/6
Madison	4/6	5/6	5/28	4/5	4/29	5/22
Minden	4/6	5/1	5/28	3/30	4/17	5/14
Mitchell	4/21	5/13	6/14	4/5	4/29	5/29
Nebraska City	3/31	4/22	5/11	3/20	4/9	5/3
North Platte	4/14	5/8	6/2	4/5	4/29	5/20
Oakdale	4/6	5/7	5/28	3/31	4/28	5/22
Omaha	3/21	4/26	5/15	3/10	4/9	5/8

Oshkosh	4/15	5/10	6/15	4/1	4/29	5/29
Pawnee City	3/24	4/19	5/27	3/7	4/28	5/27
Ravenna	4/13	5/8	5/31	4/6	4/13	5/20
Seward	3/30	4/22	5/15	3/23	4/13	5/4
Sidney	4/22	5/14	6/14	4/14	5/2	5/17
Stanton	4/6	5/4	5/27	3/30	4/28	5/22
Valentine	4/18	5/11	6/14	4/6	5/2	5/26
Wakefield	4/10	5/4	5/23	4/5	4/29	5/21
West Point	4/6	5/2	5/27	3/18	4/23	5/29
York	4/1	4/24	5/15	3/18	4/13	5/14

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***File G1281 under: FIELD CROPS***

***G-30, Cropping Practices***

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