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CROP WATCH

University of Nebraska Cooperative Extension
Institute of Agriculture and Natural Resources

No. 94-18
Aug. 19, 1994

Examining the odds in western Nebraska

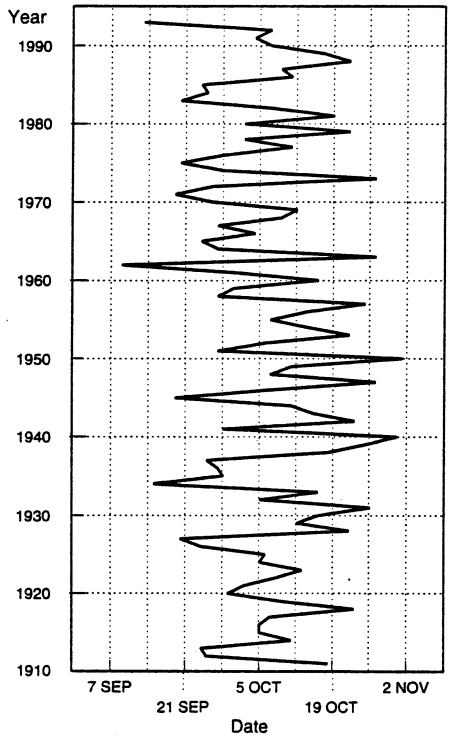
First freeze probabilities

Freezes that injure plants result from a number of cold weather conditions.

•Radiation freeze happens during the night when heat is lost from the earth's surface into the atmosphere. The last spring and first fall freezes are usually radiation freezes.

•Advection freeze happens when temperature drops below freezing from cold being transported into the area by brisk wind. Black frosts are then common.

Figure 1. First date of 28F at Mitchell, NE.



•Radiation-advection freeze results from cold air being transported into the area during daylight hours, followed by calm conditions favoring radiation freeze at night. This is the most damaging freeze.

Current freeze classifications are:

•**Light freeze** — 32oF to 29°F

•**Moderate freeze** — 28oF to 25°F

•**Severe freeeze** — 24°F or lower

Once the minimum temperature drops to 28°F, regardless of the type of freeze, the growing season is affected, and, in some crops, terminated. The year to year variability for the first 28°F freeze at the University of Nebraska Panhandle Research and Extension Center near Mitchell for the last 83 years is shown in *Figure 1*. The earliest 28°F freeze occurred on Sept. 9, 1962 and the latest on Nov. 1, 1950, a range of 53 days. The first fall 28°F-freeze has occurred prior to Sept. 21 eight times in the 83-year history of the Mitchell weather station (or roughly 10% of the time). It has occurred after Oct. 26 six times in those 83 years, or roughly 7% of the time. In 41 of the 83 years, or roughly 50% of the time, it has occurred on or before Oct. 6. Even with these data, it is impossible to forecast the first 28°F freeze; however, they do provide helpful clues. In *Figure 2*, the freeze event for each year is dropped to the bottom axis and the number of events for each day are tallied, converted to percent values (cumulated years over the 83-year period) each of which are accumulated to form the freeze probability curve. This curve shows that between Oct. 6 and 7 there is a 50% probability that plants will have had their first fall exposure to 28°F at Mitchell. The probability that a freeze has occurred by a certain date changes with location (*Table 1*). The earliest recorded occurrence of 28°F in the fall at these locations is between Sept. 6 and Sept. 9, and the latest is between Oct. 28 and Nov. 2.

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Inside

Consider potential nitrate concentrations when feeding hail damaged grains

Hail and wind storms in late June and early July damaged crops in several areas of the state. Many producers may intend to use the damaged corn as forage or may have replanted with forage sorghum or sorghum-sudangrass hybrids to provide hay or forage this fall. Those considering harvesting the crop for silage, green chop, or grazing need to be aware of possible problems with high nitrate concentrations in the feed. Hail damage reduces or completely destroys the leaf area of the plant. Decreasing the leaf area limits the photosynthetic activity of the plant so nitrates absorbed by the roots are not converted to plant proteins and can accumulate in the stem or stalk.

Harvest methods will affect nitrate levels of the feed significantly. Ensiling corn can reduce nitrate concentrations by 40% to 60% during fermentation, however high nitrate concentrations may not always be reduced to safe levels. In hail damaged crops producers should analyze the feed for nitrates. Because nitrate levels usually decline as the plant matures, harvest corn and sorghum silage as near maturity as feasible. When harvesting hail damaged crops for silage or green chop, the cutter bar should be raised to avoid harvesting the lower part of the stalk, which usually contains the highest nitrate concentration in the plant. Producers may want to consider adding grain to the silage if corn yields are less than 20 bushels per acre or if there is less than 1 bushel of grain per ton of silage produced. Energy from the grain helps in the conversion of nitrate to bacterial protein in the rumen. Producers should also be aware that due to the different proportions of leaves, stalks, and grain in the hail damaged silage the moisture content will vary accordingly.

Producers need to be very careful if considering harvesting hail damaged crops as green chop. Heating that occurs when the green chop is piled in mounds causes the conversion of nitrate to nitrite, a much more toxic form of nitrogen. If the forage is to be fed as green chop, it should be fed as soon after harvest as is possible, even overnight storage could result in nitrite poisoning.

Grazing hail damaged crops is generally not a problem, animals will tend to avoid plant parts highest in nitrates. More mature animals that have experience grazing stalks may suffer acidoses when exposed to large amounts of grain and producers may consider providing grain prior to release in damaged fields to reduce the impact of the sudden diet change.

Immature forage sorghum and/or sorghum-sudangrass hybrids or early regrowth following forage harvest can have excessively high prussic acid levels. To reduce potential problems with prussic acid, sudangrass and sorghum-sudangrass hybrids should not be grazed until they are 15 to 18 inches

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CROPWATCH

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Lisa Brown Jasa, Editor

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Freeze probabilities *(Continued from page 119)*

What does this mean for a crop?

Beans -- Planting a 100-day dry bean or soybean variety on June 28 means it will mature on Oct 6 or later. There is about a 50:50 probability that the variety will freeze before maturing.

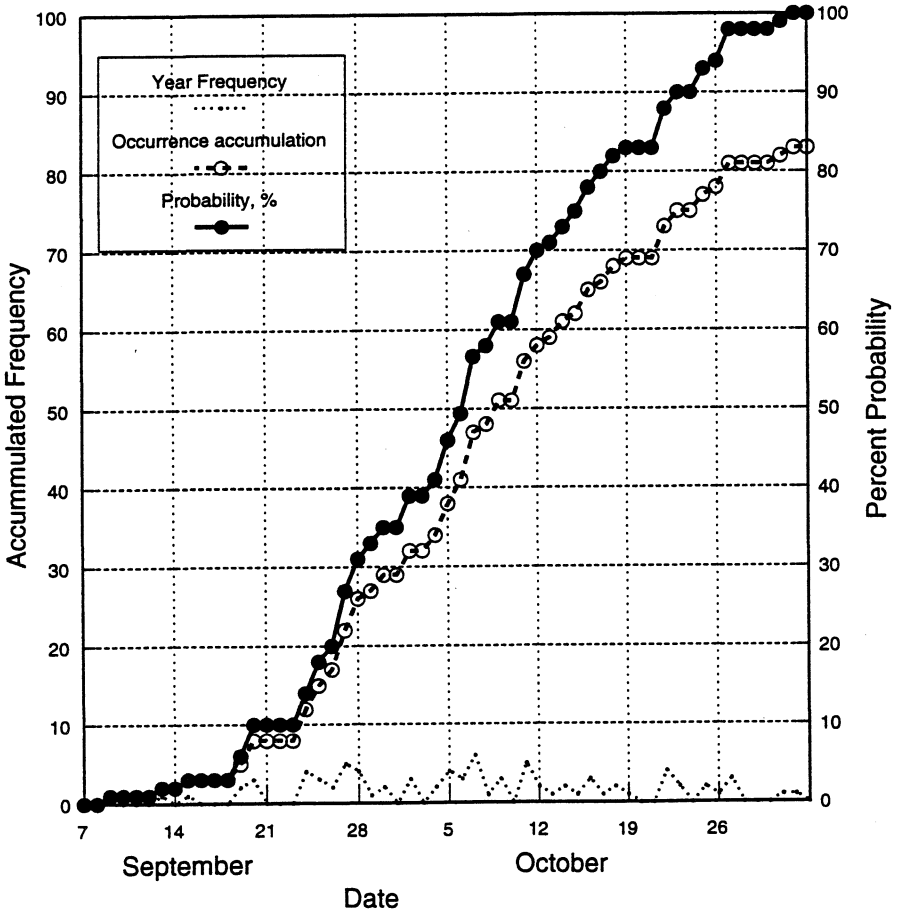
Corn -- A hybrid that fails to accumulate enough heat units prior to Sept. 21 will suffer fall freeze injury more often than one out of 10 years. The closer corn is to full maturity the less is the damage from freeze.

Table 1. Dates for the 25%, 50% and 75% probability level for the first fall exposure to 28°F for selected locations in the Nebraska Panhandle.

Probability level for first fall exposure to 28°F

Location	*25%*	*50%*	*75%*
Harrison	Sept 19-20	Sept 26-27	Oct 5-6
Alliance	Sept 26-27	Oct 6-7	Oct 15-16
Mitchell	Sept 26-27	Oct 6-7	Oct 15
Bridgeport	Sep 23-24	Oct 3	Oct 8
Kimball	Sept 26	Oct 4-5	Oct 11

Figure 2. Frequency and probability of a fall occurrence of 28F in Mitchell, NE, from 1911 to 1993.



Potato -- There is less than a 5% probability that vines will freeze by Sept. 15. Chemical and/or mechanical desiccation is needed by Sept. 10 to allow three weeks for tubers to mature and be harvested on Oct 1.

Sugarbeet -- In the fall, sugarbeets tolerate light to moderate freezes. A light freeze may even increase sugar content in the root. Severe freezes, below 25°F, lasting several hours, will damage sugarbeet leaves and roots. Note that sugarbeet is harvested during the high freeze-probability period starting the second week of October. Sugarbeet leaves heavily infected with powdery mildew are damaged more by an early freeze than healthy leaves. Late season development of the disease in itself may cause little yield loss but would enhance freeze damage.

Sunflower -- Heat unit requirements can be calculated in the same way as corn. Adjust hybrid maturity ratings and date of planting to reduce the risk of freeze.

Winter small grains -- Winter wheat and other fall planted cereals have a temperature threshold lower than 28°F for ending fall growth.

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all at the Panhandle Research and Extension Center, Scottsbluff

Cool, wet conditions contribute to disease development

Identifying white mold of soybeans

We've received a few calls and samples about Sclerotinia stem rot (a.k.a. white mold) of soybeans. This disease, caused by the fungus *Sclerotinia sclerotiorum*, is generally of minor importance in Nebraska but can reduce yields when severe.

Symptoms include dead plants where the leaves have turned gray green then brown, but remain attached to the stem. The foliar symptoms may look like phytophthora root rot, brown stem rot or stem canker except for the white cottony mycelium and tan to white stem lesions. Development of black sclerotia in or on the stem is very diagnostic. The disease tends to develop in plant clusters rather than in single plants at scattered sites. When you split the stem, you may see sclerotia within the pith. Secondary spread within a field occurs when infected plant parts contact healthy tissues. In this way the disease may progress beyond the initial infection sites. After the initial infections, secondary spread accounts for further disease development.

Sclerotinia stem rot is most common when cool, wet conditions prevail during flowering periods. We had a few reports of this disease in 1992, but none last year. This may seem strange considering the excessive rainfall last summer; however, when most of the soybeans in Nebraska were blooming last year the temperatures were not cool enough for disease to develop. This demonstrates how Sclerotinia stem rot is highly dependent on specific environmental conditions.

The other factor to consider in disease occurrence is the source of initial inoculum. Fields that have been in a year to year corn-soybean rotation and relatively weed free are showing infection. So where did the disease come from?

Fungal sclerotia survive for many years in soil. These sclerotia are about the same size as soybean seed and can be collected during harvest. If an infected field is used as a seed source, the sclerotia may be transferred to a new field. This can happen with "bin run" seed, but is uncommon with commercial seed. Also, *Sclerotinia sclerotiorum* has a wide host range including crops such as dry beans and alfalfa along with common weeds like lambsquarter, red-rooted pigweed, velvet leaf and common ragweed. These crops and weeds help maintain the presence of the disease.

Sclerotinia stem rot is difficult to control. Fortunately, it is extremely dependent upon specific weather conditions. Sclerotinia stem rot outbreaks are rare except in cases where extensive irrigation is used. Control measures include the use of wider rows for planting. We suggest that those fields with a history of this disease not be planted to drilled beans. The plant canopy influences disease by affecting moisture and temperature. Open plant canopies can result in 50% less infection than a closed canopy. Fields with no-till practices or very heavy residues are more subject to repeated outbreaks. Burial of the sclerotia helps reduce its survival and germination. Other controls include shorter soybean varieties that do not tend to lodge, correct fertilization and avoidance of rotation with dry edible beans. Chemical controls are not available due to high costs. For the most part, current varieties offer little or no resistance to the disease. Ongoing research at the University of Nebraska is evaluating varieties grown in Nebraska for disease tolerance.

Diane Merrell, Extension Assistant, Plant Pathology

High nitrate grain

(Continued from page 120)

tall, and forage sorghums should not be grazed until they are at least two to three feet tall. Prussic acid is rarely a problem in forages that are harvested and stored for later feeding, however if toxic levels are suspected an analysis should be performed.

Forages that are high in nitrate can be diluted with grain or other forages low in nitrates and fed safely. Nearly all commercial feed and soil testing laboratories and UNL will analyze feeds for nitrates, this is strongly suggested for grazing or feeding hail damaged corn and forage sorghum crops.

Todd Peterson, Extension Cropping Systems Specialist
Bruce Anderson, Extension Forage Specialist
Kim Fleming, Research Technologist, Agronomy

Corn, soybeans 93% good to excellent

The Nebraska Agricultural Statistics Service Monday reported that 93% of the state's corn crop was reported in good to excellent condition. Soybean condition also was rated 93% good to excellent. Sorghum was rated 90% good to excellent with heading 97% complete. Dry bean condition was rated 78% good to excellent with about 94% of the acreage having set pods. Alfalfa condition was rated 73% good to excellent.

Nebraska Agricultural Statistics

Weather shift may lead to more precipitation

Numerical models indicate a gradual breakdown of the upper air ridge that has dominated the western United States since early June. An upper air low is expected to gradually develop over this area, which in turn should increase precipitation chances. This may give the Panhandle region a reprieve from the dry weather that has been the main weather feature during 1994.

The westerlies (jet stream winds) are becoming stronger as we approach fall and they should begin dropping farther south into the United States. As low pressure systems work into the far west, the upper air high pressure system will be pushed south and east. The term "dog days of summer" may become prevalent across eastern Nebraska as some of the heat from the west moves east.

The expected increase in temperatures should help offset the recent cool trend. Crop phenology has slowed to average. However, because crops were planted ahead of the five-year average, crop maturity should still be 7 to 10 days earlier than average given normal growing conditions through the remainder of the growing season.

Maturity estimates:

Soybeans: Sept. 10
Corn: Sept. 15
Sorghum: Sept. 22

As of August 14, 83% of the corn crop was in the dough stage and 17% had reached early dent. The sorghum crop had headed in 97% of the fields, with 9% of the crop turning color. The soybean crop is setting pods in 96% of the fields and 2% of the fields are turning color. If normal conditions persist, our phenology programs indicate an average maturity date of Sept 10 for the soybean crop. Northern areas will be later than this date, while southern areas will be earlier. The average maturity date for corn is projected to be Sept. 15 and for sorghum, Sept. 22. Crop water use will rapidly decline over the next two weeks as the crops approach maturity. Generally, Sept. 1 marks the beginning of the soil recharge season and runs through April 1. Soil moisture

(Continued on page 125)

Palmer drought and crop moisture data for week ending Aug. 14

	Tmp (F)	*Prcp (in)*	*Soil moisture upper layer (in)*	*Soil moisture lower layer (in)*	*Pct fld CPC end week*	*Pot evap (in)*	*Run off (in)*	*Crop moist index*	*Chng from prev week*	*Month moist Anoml (Z) index*	*Prelim-P final-F Palmer drought index*	*Precip needed to end drought (in)*
Panhandle	74	0.3	0.00	1.36	15	1.25	0.00	-1.77	-0.27	-2.18	-4.28 F	5.62
North Central	71	0.4	0.00	4.26	53	1.13	0.00	0.11	-0.15	0.34	1.93 P	
Northeast	69	0.5	0.00	5.53	55	1.05	0.00	-0.15	-0.10	-0.45	0.66 P	
Central	72	0.3	0.00	7.09	64	1.15	0.00	0.25	-0.24	0.91	2.88 P	
East Central	72	1.6	0.46	8.00	85	1.14	0.00	0.89	0.54	1.14	3.40 P	
Southwest	73	0.4	0.00	4.36	44	1.18	0.00	0.11	-0.16	0.09	1.51 P	
South Central	73	0.3	0.00	6.32	63	1.16	0.00	0.45	-0.26	1.02	3.76 P	
Southeast	73	0.8	0.00	6.66	61	1.16	0.00	-0.07	0.03	-0.32	0.58 P	

For more information on using this index, see the July 1, 94-13, issue of *Cropwatch*.

Temp — Average weekly temperature Prcp — Average weekly precipitation
Soil moisture upper and lower layers — Upper layer is 6 inches and lower lawyer is 4.5 feet
Pot. Evap. — Potential evapotranspiration using the Thornwaites method
Change from previous week — The difference between last week's CMI and this week's CMI (negative values indicate a drying soil)
Month moist anomil (Z) index — The monthly moisture anomaly (Z) index
Prelim./Final Palmer Douth Index — Either a preliminary or a final Palmer Drought Severity Index

Nebraska weather data as of August 14

	Growing degree days*				Precipitation***				Evapotranspiration rates						
Accumulated	*Fahrenheit, Base 50***				*8/7-8/14*		*4/1-8/14*		*Emer*	*Prior*	*Prior*		*Next*	*Next*	
from	*5/1*	*5/10*	*5/20*	*5/31*	*Act*	*%****	*Act*	*%****	*Date*	*Week*	*3 Days*	*8/14*	*3 Days*	*Week*	*Days*****
Ainsworth	2124	2046	1848	1645	.31	50	12.64	93	5/5	.16	.21	.24	.29*	.31*	-1
Alliance	2064	1976	1794	1628	.11	27	4.14	37	5/5	.31	.33	.33	.36*	.37*	1
Arthur	2087	2002	1824	1637	.16	37	10.94	88	5/5	.21	.24	.26	.31*	.33*	4
Beatrice	2431	2359	2172	1925	.69	76	13.69	84	5/5	.23	.27	.25	.32*	.33*	1
Central City	2310	2238	2041	1789	.08	14	13.38	88	5/20	.18	.22	.21	.30*	.32*	-4
Clay Center	2356	2285	2095	1857	.55	79	14.92	97	5/5	.21	.23	.23	.31*	.34*	0
Concord	2111	2051	1866	1641	.72	114	12.20	80	5/20	.14	.16	.23	.24*	.27*	-6
Curtis	2371	2287	2101	1884	.30	56	8.28	61	5/5	.28	.32	.30	.37*	.38*	5
Elgin	2146	2082	1893	1665	.00	0	13.62	90	5/20	.14	.18	.22	.27*	.30*	-4
Gordon	2040	1961	1775	1611	.12	28	9.72	80	5/20	.27	.31	.35	.34*	.33*	1
Grant	2347	2259	2073	1858	.20	40	7.36	59	5/5	.31	.33	.35	.38*	.40*	1
Holdrege	2405	2324	2138	1912	.33	50	15.00	99	5/5	.24	.24	.24	.31*	.34*	2
Lincoln	2511	2439	2240	1975	.31	40	14.92	98	5/5	.22	.25	.25	.31*	.33*	0
McCook	2550	2457	2259	2032	.71	127	10.67	82	5/5	.25	.24	.23	.31*	.35*	4
Mead	2305	2233	2044	1798	.35	36	16.37	88	5/5	.20	.24	.24	.29*	.30*	-2
North Platte	2228	2145	1960	1751	.00	0	12.01	95	5/5	.23	.25	.28	.32*	.34*	3
O'Neill	2087	2017	1833	1630	.28	44	16.89	120	5/20	.14	.17	.22	.26*	.29*	-5
Ord	2237	2162	1973	1752	1.10	143	16.97	121	5/20	.16	.19	.23	.28*	.31*	-1
Red Cloud	2447	2374	2192	1956	.13	17	12.31	81	5/20	.26	.29	.26	.33*	.34*	1
Rising City	2295	2228	2043	1794	.08	11	15.59	111	5/5	.19	.22	.22	.30*	.32*	-1
Scottsbluff	2233	2131	1939	1749	.16	56	10.28	93	5/5	.31	.32	.32	.37*	.40*	3
Shelton	2369	2294	2094	1844	.02	3	15.51	108	5/5	.19	.22	.22	.30*	.32*	-1
Sidney	2152	2062	1890	1709	1.18	281	10.28	93	5/5	.29	.29	.33	.35*	.38*	7
Tarnov	2197	2131	1950	1722	.16	22	14.53	94	5/5	.17	.21	.23	.29*	.32*	-2
West Point	2268	2196	2005	1755	.71	39	15.75	100	5/20	.14	.16	.21	.24*	.27*	-4

*Using the growing degree days accumulated since emergence as a guide:
corn is estimated to mature at about 2400 for short season hybrids; 2500 for midseason, and 2700 for long season hybrids;
soybeans are estimated to mature at about 1950 for short season hybrids; 2360 for midseason, and 2450 for long season hybrids; and
sorghum is estimated to mature at about 2125 for short season hybrids; 2200 for midseason, and 2350 for long season hybrids.

**Base 50 is used for corn, sorghum and soybean production.

***Precipitation is a seven-day summary ending on Aug. 14.

****Percent of normal precipitation levels.

*****Days indicates number of days ahead or behind normal, relative to accumulated growing degree days on Aug. 14.

Kansas crop update

Fall crops remain mostly in good condition with sorghum and soybeans just beginning to show some stress from lack of moisture.

For the state, 85% of the corn is in the dough stage, compared to only 55% at this time last year and the average of 70%. Thirty percent of the corn is in the dent stage, ahead of 15% in 1993 but on par with the average. Statewide, 3% of the acreage is mature (safe from frost), just behind 5% one year ago and the average of 10%. Timely rains fell in the northwest, north central, and southeast, improving the corn crop. Condition is rated 92% good to excellent, 7% fair, and 1% poor to very poor.

Sorghum stands across the state are 85% headed. This compares to 50% at this time last year and the average of 45%. Fifteen percent of the acreage is turning color, well ahead of 2% in 1993 and the average of 5%. A few fields in the south central region are mature. Scattered showers missed sorghum fields in most central and eastern areas. Eighty-one percent of the acreage is in good to excellent condition, 18% is fair, and 1% is poor to very poor. Ninety-six percent of the states soybeans are blooming, compared with 80% last year and the average of 85%. Across the state, 75% of the acreage is podding, compared to 55% both one year ago and average. A few fields in south central counties are shedding leaves. The warmest temperatures in the state and very little moisture led to a decline of the soybean condition in the central and south central districts. Statewide, condition of the acreage is 79% good to excellent and 21% fair. Surface soil moisture is rated 68% short to very short, 28% adequate, and 4% surplus. Subsurface moisture is rated 35% short to very short, 63% adequate, and 2% surplus.

Statewide, there were 6.5 days suitable for fieldwork during the week. Pasture conditions across the state are declining due to the lack of moisture, but are still rated mostly good. Statewide, the third cutting of alfalfa is 95% complete, compared to 60% last year and the average of 70%. The fourth cutting is 15% harvested, ahead of 2% in 1993 and the average of 10%.

National Weather Service, Topeka
KSU Cooperative Extension Service
Kansas Agricultural Statistics

Kansas insect update

Large numbers of second generation chinch bugs were found in some sorghum fields in southeast and central Kansas this past week. Many of these bugs were adults or nearing the adult stage and so were very noticeable. Large numbers of half-grown bugs were still present behind lower leaf sheaths of scattered plants in a field in Dickinson County. Sorghum growers in all areas where this pest has sometimes been a problem are encouraged to regularly check their fields for this pest during the next few weeks especially in dry areas and fields with thin stands.

Heavy infestations of spider mites were reported on corn at sites in western Kansas. Limited surveys during the past two weeks have indicated that the greenbug was generally not caused serious damage to Kansas sorghum except in isolated cases in counties in the western half of Kansas. Heavy infestations and damage have been noted in Haskell and Finney counties in the southwest and in Phillips and Russell counties in north central and central Kansas. Evidence of a previous very heavy infestation was noted in a field in Scott County.

Little serious damage was noted in the field except all leaves had been killed on plants in small spots in the field. In the latter field, lady beetles and parasitic wasps (very abundant(had drastically lowered the greenbug population to an average of about 14 per plants, but numbers ranged up to 1000+ on a few plants. The variety in this latter field seemed to have had a lot of resistance to the (predominant) greenbug biotype present. Greenbugs were light but still building in some fields in south central and parts of southwest Kansas where predators were light and parasitic wasps were generally not found or very scarce.

Kansas Department of Agriculture Insect Survey Report (Aug. 12)

Suggestions requested for Herbicide Use Guide

Users of the UNL Extension Nebraska Herbicide Use Guide are invited to submit suggestions for the 1995 edition. We appreciate your previous input. You have helped make the Guide a most useful weed control aid for farmers, dealers, applicators, farm managers, consultants, Extension educators, and others.

Please send your suggestions by Sept. 1 to the Agronomy Department-Weed Science, Attention: John McNamara, 362 Plant Science Building, University of Nebraska, Lincoln, NE 68583-0915.

Alex Martin, Extension Weeds Specialist
John McNamara, Extension Assistant, Agronomy-Weed Science

Potential precipitation

(Continued from page 123)

monitoring activities at the High Plains Climate Center indicate that dry conditions now cover the Panhandle, southwest, extreme south central, and southeast Nebraska. There has been a gradual shift to drier subsoil levels during the summer. This area has been slowly building northeastward from western Oklahoma and Kansas since early May.

Although subsoil moisture levels remain in good shape over most of the state, a shift to drier and warmer conditions this fall could spell potential problems for the 1995 growing season. To avoid drought conditions in Nebraska, it is critical that dryland areas contain at least 50% of the available moisture that can be stored in the soil by spring planting. At present most areas hold between 40% and 70% of the potential available moisture. On average, the corn crop will use about 4 to 5 inches of water before maturity. If rainfall fails to cover crop needs, subsoil levels will be further depleted. We will continue to monitor the situation this fall and issue "probability of recharge" statements at the end of the growing season.

Al Dutcher
State Climatologist
Agricultural Meteorology