Chances of Dry Periods in Missouri
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Dry periods are common during summer in all areas of Missouri. Short periods without rain may be welcome for such agricultural operations as the preparation of seedbeds, hay curing, or other harvest operations, but most dry periods are harmful to agriculture. Studies were undertaken to learn (1) the regions in Missouri where dry weather is a great hazard and (2) times during the summer that rainfall-deficient periods occur with the greatest frequency in these regions.

Knowledge of the likelihood of dry periods can assist you in planning management practices more suitable to the climate of the state. The adjustment of planting dates can often prevent crops from entering critical stages of development when there is a great risk of dry weather. Plant breeders need to consider these regional patterns of dry weather, too, when developing new crops and varieties of old crops.

Dry Periods and Their Significance

For purposes of this study, a dry period is defined as a series of consecutive days with little or no rain. It is determined entirely on the basis of the climate of an area; crop development is not considered. This gives a distinction between the occurrence of drouth and the occurrence of a dry period. A drouth begins when there is insufficient water in the soil to care for a plant’s needs. Yields are reduced as a result of drouth and plants may die when exposed to prolonged periods of drouth.

The length of a dry period is determined by the number of consecutive dry days. A dry day is one with insufficient rainfall to take care of the daily need by crops. Recent research at the Missouri Agricultural Experiment Station indicates that about two-tenths of an inch of water is required by a complete plant cover on a warm summer day. Each day, about two-tenths of an inch of water moves from the soil, into the plant roots, through the plant and into the atmosphere. Unless there is sufficient rain to replenish the water used by the plant the day is considered a dry day.

On the assumption that a complete plant cover uses 0.2 inch of water per day, the amounts of water used during different lengths of dry periods are—

<table>
<thead>
<tr>
<th>Length of Dry Period</th>
<th>Amount of Water Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 week</td>
<td>1½ inches</td>
</tr>
<tr>
<td>2 weeks</td>
<td>3 inches</td>
</tr>
<tr>
<td>3 weeks</td>
<td>4½ inches</td>
</tr>
<tr>
<td>4 weeks</td>
<td>6 inches</td>
</tr>
</tbody>
</table>

Factors other than the length of dry periods also influence the amount of water used by a plant cover during periods with insufficient rain. During
cool weather a complete plant cover will use less than 0.2 inch of water per day while on very hot days it may use more. Plants also use water at a reduced rate when the soil has had much of its water already removed. Thus the figures given above for the relationship between water used and length of dry period should be considered only as general values.

At saturation, most of Missouri's soils have about an inch of water available for plant use in each 6-inch depth of soil. A two-week dry period will remove about 3 inches of water from the soil, which is equivalent to drying 1 1/2 feet of soil from field capacity to the wilting point. A four-week dry period will remove all the water available for plant use from 3 feet of soil that is filled to capacity at the start. Of course, if the soil is not at field capacity at the beginning, the dry period will be even more disastrous.

Notable Dry Periods In Missouri

There have been many long periods without rain of consequence in Missouri. At Hannibal, in the northeast, a dry period began on July 6, 1947, and continued through September 19, a 76-day period. The longest dry periods of record for 17 locations in Missouri are listed in Table 1.

The 1930s supplied more record-breaking dry periods than any other decade. The longest dry periods on record occurred at five locations in the state during 1936. The years 1930 and 1934 each presented two locations with their longest dry periods. Even during the more productive years of the twenties and forties a few locations had their longest periods without rain of consequence. Of the locations listed in the table only Springfield had the longest dry period of record during the fifties.

These dry periods of record-breaking length have occurred in every month of the summer, but fewer began in May than in the remaining three summer months.

<table>
<thead>
<tr>
<th>Region</th>
<th>Location</th>
<th>Began</th>
<th>Ended</th>
<th>Year</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northwest</td>
<td>Tarkio</td>
<td>August 18</td>
<td>September 28</td>
<td>1939</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Bethany</td>
<td>June 7</td>
<td>July 19</td>
<td>1936</td>
<td>43</td>
</tr>
<tr>
<td>Northeast</td>
<td>Unionville</td>
<td>August 19</td>
<td>October 3</td>
<td>1940</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Macon</td>
<td>June 22</td>
<td>August 10</td>
<td>1934</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Hannibal</td>
<td>July 6</td>
<td>September 19</td>
<td>1947</td>
<td>76</td>
</tr>
<tr>
<td>West Central</td>
<td>Kansas City</td>
<td>July 14</td>
<td>September 6</td>
<td>1945</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Lebanon</td>
<td>July 10</td>
<td>August 18</td>
<td>1941</td>
<td>39</td>
</tr>
<tr>
<td>East Central</td>
<td>Columbia</td>
<td>May 25</td>
<td>July 13</td>
<td>1936</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Farmington</td>
<td>July 2</td>
<td>August 31</td>
<td>1936</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>Rolla</td>
<td>June 12</td>
<td>July 25</td>
<td>1934</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>St. Louis</td>
<td>July 22</td>
<td>September 5</td>
<td>1930</td>
<td>46</td>
</tr>
<tr>
<td>Southwest</td>
<td>Mountain Grove</td>
<td>August 2</td>
<td>September 12</td>
<td>1943</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Neosho</td>
<td>July 2</td>
<td>August 28</td>
<td>1936</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>Springfield</td>
<td>June 2</td>
<td>August 3</td>
<td>1953</td>
<td>63</td>
</tr>
<tr>
<td>Southeast</td>
<td>Poplar Bluff</td>
<td>August 23</td>
<td>October 15</td>
<td>1922</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Caruthersville</td>
<td>May 14</td>
<td>June 30</td>
<td>1936</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Cairo, Illinois</td>
<td>June 17</td>
<td>August 16</td>
<td>1930</td>
<td>61</td>
</tr>
</tbody>
</table>
How to Interpret Information:

The graph shows the expected frequencies of dry periods of one, two, three and four weeks length for northwest Missouri. The lengths of the bars indicate the number of dry periods expected during each half month of the growing season over a period of 40 years. For example, during the first half of May (first bar on left), you can expect dry periods of at least—

- **one week** to begin 39 times in 40 years, or about one each year.
- **two weeks** to begin 12 times in 40 years, or one every two or three years.
- **three weeks** to begin 3 times in 40 years, or one every thirteen years.
- **four weeks** to begin 1 time in 40 years.

Trends in Frequency of Dry Periods in Northwest Missouri:

1. Fewer dry periods are expected during the first half of June than during May. Dry periods of at least one week duration are one-third less frequent in early June. The first half of June is similarly favored by fewer dry periods of two, three and four weeks' length.
2. Dry periods are more frequent from June 15 until August 1 than during early June. The frequency of dry periods is fairly uniform during this period. An exception to this generalization is the increase in likelihood of dry periods of two or more weeks during early July. For example, a three week dry period, beginning in the first half of July, will occur twice as often as one in late June and late July.
3. Early August is a time of low dry period expectancy in northwest Missouri. Dry periods of at least one week duration occur one-third as often and those of three weeks length, one-half as often in early August as in late July.
4. There is a sharp increase in the likelihood of dry periods during the second half of August. Periods of a week without rain of consequence occur 1½ times more often during late August than during the first half of the month.

Use of Information in Farm Planning.

- In northwest Missouri, there is a low incidence of dry weather in early June and early August.
- Early summer plantings should be completed prior to the beginning of June so that the crop and soil are ready to receive the moisture.
- Select planting dates and varieties of corn and soybeans which will permit these crops to enter the critical bloom and post-bloom stages during early August.
How to Interpret Information:

The graph shows the expected frequencies of dry periods of one, two, three and four weeks length for northeast Missouri. The lengths of the bars indicate the number of dry periods expected during each half month of the growing season over a period of 40 years. For example, during the first half of May (first bar on left), you can expect dry periods of at least—

one week to begin 38 times in 40 years; or nearly one a year.
two weeks to begin 10 times in 40 years, or one every four years.
three weeks to begin 3 times in 40 years, or one every thirteen years.
four weeks to begin 1 time in 40 years.

Trends in Frequency of Dry Periods in Northeast Missouri:

1. Early May has a relatively high frequency of dry periods of at least one week duration; about 12 percent more occur during the first half of the month than during the last half.
2. The first half of June is a time of low dry period expectancy. Dry periods of at least a week occur 20 percent less frequently in early June than during late May. Dry periods of two and three weeks occur only about 50 percent as often in early June as in late May.
3. There is a sharp increase in the frequency of dry periods during the last half of June. All semi-monthly intervals from late June through July exhibit about the same frequency of dry periods.
4. Northeast Missouri experiences a sharp decline in the likelihood of dry periods of one and two weeks length in early August. There are 20 and 30 percent fewer dry periods of one and two weeks length during the first half of August than in late July.
5. Late August has a higher likelihood for dry periods than any semi-monthly period. When compared with the first half of the month, late August encounters about 50 percent more dry periods of each length.

Use of Information in Farm Planning:

- Early June and early August are periods of low dry period incidence, while early May and late August offer the greatest risk of dry weather.
- Land preparation and early summer planting should be completed prior to June 1, because of the low frequency of dry periods during early June.
- When possible, select planting dates and varieties of corn and soybeans which will permit these crops to enter the critical bloom and post-bloom stages in early August, when the likelihood of short dry periods is reduced.
How to Interpret Information:

The graph shows the expected frequencies of dry periods of one, two, three and four weeks length for west central Missouri. The lengths of the bars indicate the number of dry periods expected during each half month of the growing season over a period of 40 years. For example, during the first half of May (first bar on left), you can expect dry periods of at least—

- one week to begin 42 times in 40 years, or average more than one a year.
- two weeks to begin 10 times in 40 years, or one every four years.
- three weeks to begin 3 times in 40 years, or one every thirteen years.
- four weeks to begin once in 40 years.

Trends in Frequency of Dry Periods in West Central Missouri:

1. Dry periods of at least one week duration occur 25 percent more frequently during early May than in late May.
2. Early June is a period of low risk of dry weather. Dry periods of one week length occur one-third as frequent during early June as during late May. Two-week dry periods begin in early June one-third as often and three and four-week dry periods, about half as often as in late May.
3. The frequency of dry weather increases in late June and remains nearly the same throughout July. The chief exception to this rule is a 15 percent decrease in the expected number of dry periods of one week length in early July.
4. Early August is characterized by a low expectancy of dry periods of one and two weeks. Dry periods of a week duration occur in early August about three out of four years, compared with a frequency of one every year in late July. Two-week dry periods begin in early August with one-third the frequency of late July.
5. There is a sharp increase in the expectancy of dry periods of one and two weeks length in late August. These dry periods are 50 percent more frequent during late August than during the first half of the month.

Use of Information in Farm Planning:

- Early June and August are associated with periods of a low frequency of dry weather, while early May and late August are periods with a high incidence of dry weather.
- Summer-grown crops should be planted early enough to make maximum use of high rainfall associated with the first half of June.
- Select corn and soybean planting dates and varieties which will permit these crops to enter their critical bloom and post-bloom stages in early August.
How to Interpret Information:

The graph shows the expected frequencies of dry periods of one, two, three and four weeks length for east central Missouri. The lengths of the bars indicate the number of dry periods expected during each half month of the growing season over a period of 40 years. For example, during the first half of May (first bar on left), you can expect dry periods of at least—

- **one week** length to begin 43 times in 40 years, or more than one each year.
- **two weeks** length to begin 11 times in 40 years, or about one each four years.
- **three weeks** length to begin 2 times in 40 years, or one each twenty years.
- **four weeks** length to begin 1 time in 40 years.

Trends in Frequency of Dry Periods in East Central Missouri:

1. Dry periods of one week duration are more abundant during early May than during the last half of the month, but the longer dry periods appear to be more abundant during late May.
2. The incidence of dry weather declines in early June. This reduction is noted for dry periods of all lengths.
3. During the period from June 15 to August 1, the frequency of dry periods of two or more weeks is nearly the same. There is a decrease in the incidence of dry periods of one week length in early July. There are 15 percent fewer dry periods of one week duration in early July than in late June and late July.
4. Early August presents the smallest risk for dry periods of one and two weeks duration. One and two-week dry periods are 40 percent less frequent in early August than in late July.
5. Dry periods of all lengths are more frequent in late August than during the first half of the month.

Use of Information in Farm Planning:

- In East Central Missouri, there is a low incidence of dry weather in early June and early August. Late May and early July display small decreases in the expected number of dry periods of one week duration. Early May and late August are periods with the greatest hazard of dry weather.
- When possible, complete early summer plantings in early May to make use of the low expectancy of short dry periods in late May and early June.
- Select planting dates and varieties of corn and soybeans which will permit these crops to enter the critical bloom and post-bloom stages in early August, when there is a low incidence of dry weather.
How to Interpret Information:

The graph shows the expected frequencies of dry periods of one, two, three and four weeks length for southwest Missouri. The lengths of the bars indicate the number of dry periods expected during each half month of the growing season over a period of 40 years. For example, during the first half of May (first bar on left), you can expect dry periods of at least—

one week length to begin 33 times in 40 years, or about four times every five years.
two weeks length to begin 7 times in 40 years, or one every six years.
three weeks length to begin 2 times in 40 years, or one every twenty years.
four weeks length to begin 1 time in 40 years.

Trends in Frequency of Dry Periods in Southwest Missouri:

1. Southwest Missouri is the only region of the state with a low expectancy for dry weather during early May. Compared with the second half of the month, early May has 10 percent fewer dry periods of one week length and one-third fewer periods with two and three weeks of dry weather.
2. Dry periods of one, two and three weeks occur during early June with about three-fourths the frequency of late May.
3. Late June shows an increase in the frequency of dry weather. In late June there are 40 percent more one-week dry periods than in early June; two-week dry periods are twice as likely and three and four-week dry periods are three times as frequent.
4. Except for a 20 percent decrease in the frequency of dry periods of one weeks length in early July, the expectancy of dry periods is uniform throughout July.
5. During early August there are 25 percent fewer dry periods of one and two weeks length than during late July.

6. Late August shows an increase in the expected number of dry periods of one and two weeks length.

Use of Information in Farm Planning:

• The first halves of May, June and August are periods with comparatively low frequencies of dry weather. Late June and late August are the periods which provide the greatest hazard of dry weather.
• The low incidence of dry weather in early May provides a condition favorable for early planted crops or crops which develop rapidly during the early summer.
• Planting of summer grown crops should, when possible, be completed prior to early June because of the low incidence of dry weather in this period.
• Choose planting dates and varieties of corn and soybeans that enable these crops to enter the critical bloom and post-bloom stages during early August, when there is a smaller chance for one and two-week dry periods.
How to Interpret Information:

The graph shows the expected frequencies of dry periods of one, two, three and four weeks length for southeast Missouri. The lengths of the bars indicate the number of dry periods expected during each half month of the growing season over a period of 40 years. For example, during the first half of May (first bar on left), you can expect dry periods of at least—

one week length to begin 38 times in 40 years, or nearly one each year.
two weeks length to begin 12 times in 40 years, or one each three or four years.
three weeks length to begin 4 times in 40 years, or one each 10 years.
four weeks length to begin 2 times in 40 years, or one each 20 years.

Trends in Frequency of Dry Periods in Southeast Missouri:

There is a gradual decrease in the frequency of dry periods of one week length from early May until the middle of June. For longer dry periods, the expected number remains unchanged throughout the six week interval.

2. Late June displays an increase in the likelihood of dry periods. The frequency of one and two-week dry periods increases 20 and 37 percent, compared with early June.

3. Early July produces fewer dry periods than late June. There are 20 percent fewer one-week dry periods, compared with late June, and the longer dry periods are also less frequent.

4. Dry weather increases in the second half of July. When compared with early July, dry periods of one and two weeks are 25 and 50 percent more abundant in late July.

5. There is a sharp decrease in the expected number of dry periods in early August. This period has the lowest expectancy of any for dry periods.

6. Late August resembles late July in expected number of dry periods; the hazard of dry weather is high.

Use of Information in Farm Planning:

- The first halves of June, July and August are times with a low risk of dry weather, while early May and late July and August have a high frequency of dry periods.
- Early planting should be practiced to have the soil ready for the low incidence of dry weather in early June. This early June decline in risk of dry weather is not as marked in the southeast region as in other areas of the state.
- Cotton growers may be able to use the variation in dry period expectancies during July and August in the production of plants which drop fewer cotton bolls.
- For best results, select planting dates and varieties of corn and soybeans which permit the plants to enter the bloom and post-bloom stages in early August.
Statewide Variation in Dry Periods

There is a great deal of similarity between the regions of the state in the seasonal distribution of dry periods. All regions exhibit about the same likelihood for a dry period of a given length during the same semi-monthly interval.

The west central and east central regions have 10 percent more dry periods of one- and two-week duration than other areas in the state. The east central and southeast regions have more dry periods lasting three and four weeks than the other areas. The common belief that dry periods are more frequent in southwest Missouri during the summer is not upheld by the figures compiled in this study. It may be true that more summer drouths are experienced in this region, but this is due to the low water holding capacity of the soil instead of a higher incidence of dry weather.

Early June is a time of low dry period incidence in all parts of the state. The tendency for wet weather in early June is most pronounced in the north and west. In southeast Missouri the probability of dry spells of two, three and four weeks is the same in early June as in late May.

The first half of August is also a time when dry periods have a comparatively low likelihood in all regions of the state. This fact should be used by Missouri farmers in planning their activities. Farmers may reduce the hazard of dry weather by selecting varieties and planting dates for corn, soybeans and cotton which permit the crops to reach their critical stages of development during this period. The most critical times are when the plants are in their bloom and post-bloom stages. This is when pollination and development of the young seed embryos takes place.

The seasonal distribution of dry periods in south Missouri is distinctively different in some respects. One unusual difference is the comparatively low probability of dry periods during early May in southwest Missouri. Another difference in southern Missouri is the lower frequency for dry periods of one-week length in early July than during late June and late July.