Weather Patterns for the 2004 Growing Season

Knoxville, Plateau, Highland Rim, Middle Tennessee, West Tennessee, Milan and Ames Plantation Agricultural Experiment Stations

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Overview of growing season:

The most serious weather hazards during the growing season in 2004 in Tennessee were related to tornadoes. A line of thunderstorms moved across Middle Tennessee during the late evening and early morning of May 30-31, that resulted in damaging tornadoes in some counties.

Figure 1. Tornado damage in Giles County.
(Photo courtesy of National Weather Service)

Hurricanes brought some heavy rains to parts of Tennessee in September. Remnants of Hurricane Frances (Figure 2) brought 2 inches or more to East Tennessee. The tropical depression left over from Hurricane Ivan (Figure 3)

resulted in heavy amounts of rainfall in both Middle and East Tennessee. Crossville received 4.5” during this storm.

High rainfall amounts in mid to late October resulted in harvest delay of many soybean MG V fields. The result was that many soybeans were harvested in late November and into December. Also, some fields in river bottoms were not harvested due to saturated or flooded conditions.

Figure 2. Track of Tropical depression Frances through East Tennessee on Sep 8-9, 2004 (photo courtesy of National Hurricane Center).

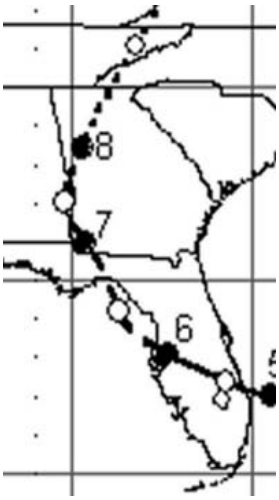


Figure 3. Total rainfall amounts from Hurricane Ivan. (photo courtesy of National Hurricane Center).

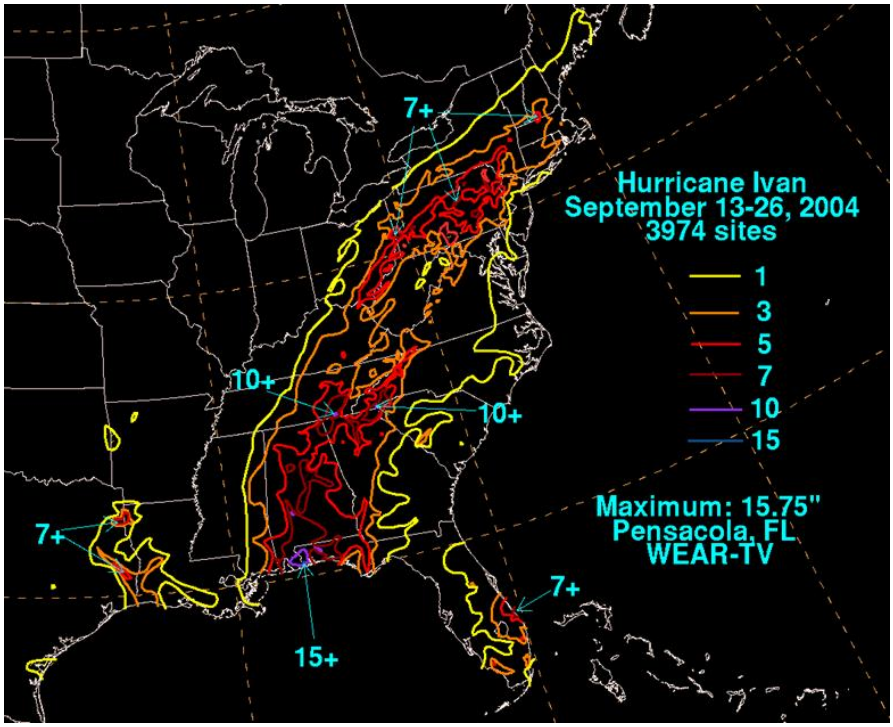
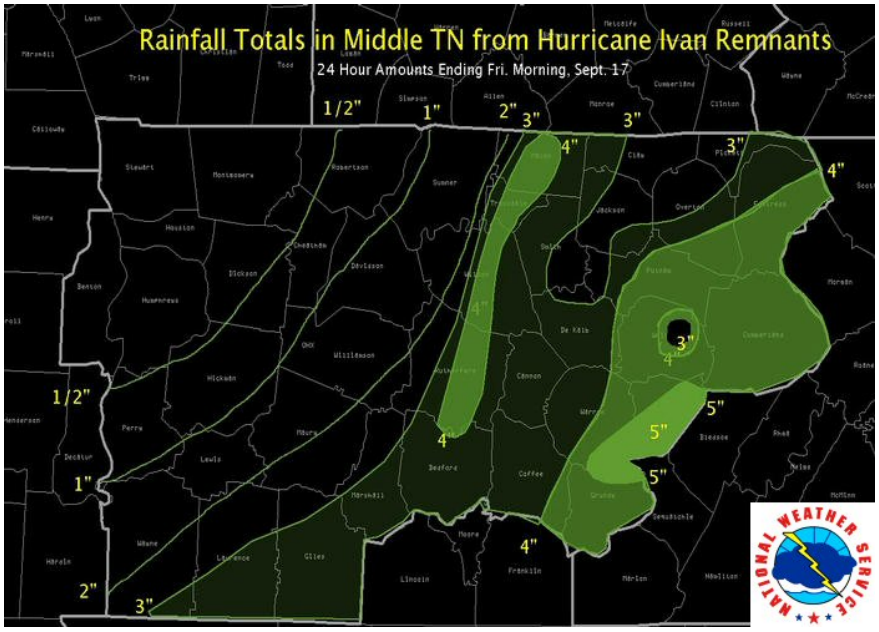


Figure 4. Rainfall totals in Middle TN from Hurricane Ivan.



Seasonal summary:

The average seasonal maximum temperatures at the Knoxville, Plateau, Highland Rim, Middle Tennessee, West Tennessee, Milan and Ames Plantation Experiment Stations in 2004 were generally unremarkable (Figure 5). However, all stations experienced higher than normal minimum temperatures, a recent trend seen throughout most of the continental U. S. Seasonal rainfall was at or above normal stations in East and Middle Tennessee (due to the effects of the hurricanes bringing rain in the typically dry September and October), and at or below normal at stations in West Tennessee.

Figure 5. Climate Summary, March – September 2004, for 7 TN Agricultural Experiment Stations.

Experiment Station	*Avg Tmax F (dev. from Normal)*	*Avg Tmin F (dev. from Normal)*	*Rainfall inches (dev. from Normal)*
Knoxville	77.5 (-0.7)	55.6 (+0.5)	37.93 (+6.9)
Plateau	74.2 (-0.1)	54.0 (+2.4)	40.27 (+5.75)
Highland Rim	77.8 (-0.5)	56.3 (+1.9)	35.04 (+4.57)
Middle Tennessee	81.0 (+0.7)	56.2 (+0.7)	32.90 (+0.04)
West Tennessee	79.4 (-0.1)	59.7 (+1.1)	31.04 (-1.48)
Milan	80.0 (+0.5)	56.9 (+3.6)	27.69 (-4.21)
Ames Plantation	80.5 (+0.1)	58.3 (+0.9)	33.19 (+0.33)

All stations in except Knoxville and Highland Rim saw a somewhat later than normal last spring freeze (Figure 6). Summer temperatures at 6 of 7 stations were remarkably cooler than normal (eg., West Tennessee, Milan and Ames Plantation), with many fewer days with temperatures greater than or equal to 90 F. For example, West Tennessee Experiment Station only had 24 days ≥ 90 F compared to a normal of 66 days, and Knoxville Experiment Station had only 5 days with temperatures above 90 F compared to a normal of 32 days. This is likely due to the greater amount of cloudiness related to low pressure systems moving through.

Figure 6. Spring Freeze Dates and Maximum Temperatures 90 F or greater.

Experiment Station	*Date of last freeze 32 F or below (temp, dev from normal)*	*No. days >= 90 F (dev. from normal)*
Knoxville	Mar 21 (31 F, -26)	5 (-27)
Plateau	May 4 (29 F, +8)	0 (-10)
Highland Rim	Apr 14 (30 F, -2)	11 (-28)
Middle Tennessee	Apr 15 (32 F, +5)	37 (+1)
West Tennessee	Apr 14 (32 F, +8)	24 (-42)
Milan	Apr 14 (32 F, +9)	30 (-24)
Ames Plantation	Apr 14 (32 F, +8)	38 (-25)

Figure 7. Rainfall characteristics of the Mar – Sep 2004 growing season.

Experiment Station	*Greatest synoptic rainfall amount in inches (dates)*	*Longest rain-free period <.05 inches in days (date)*
Knoxville	5.04 in (Jul 26-28)	11 days (Apr 15-25)
Plateau	4.51 in (Sep 16-18)	12 days (Sep 19-30)
Highland Rim	4.99 in (Apr 22-25)	13 days (Sep 18-30)
Middle Tennessee	3.12 in (May 13-16)	13 days (Sep 4-16, Sep 18-30)
West Tennessee	5.89 in (Apr 21–26)	16 days (Sep 15-30)
Milan	5.03 in (Apr 21-25)	16 days (Sep 15-30)
Ames Plantation	4.09 in (Apr 21-26)	16 days (Sep 15-30)

Knoxville Experiment Station:

As can be seen in the semi-monthly chart (Appendix Table 1A) of maximum and minimum temperatures and total precipitation, along with comparisons with normals (1971-1990) for Knoxville, one unusual feature in the temperature pattern was a cooling period that occurred in early August and continued through November. Both maximum and minimum temperatures tended to be above normal from March though June, then below normal for the rest of the season (Table 1A).

Knoxville experienced a precipitation pattern very different from the other locations, with greater than normal amounts of rainfall falling in second halves in the months of May, June, July, August, September, and October. Very few periods had below normal precipitation. The moist conditions and lack of severe heat combined for excellent crop growing conditions.

Plateau Experiment Station (Crossville):

Other than a slightly warmer than normal period from late April to late May, and another in late October through November, temperatures in Crossville were near normal (Appendix Table A2). Crossville had a greater than normal amount of rainfall in late May during the critical time of the crop growing season, late June and early July, and all of September. The jump in September rainfall was due to the passage of remnants of two hurricanes, Frances and Ivan. Weather conditions were excellent throughout the crop growing season.

Highland Rim Experiment Station (Springfield):

Highland Rim did not have a consistent pattern in temperatures throughout the season, jumping from below normal to above normal and back several times (Appendix Table A3). However, the maximum temperatures were generally below normal for late July and all of August.

Precipitation was above normal for late April to early May and again late June - early July and late August. These rainfall events occurred at a critical time for crop growth. Contrary to the other locations, precipitation was below normal for all of September and late October – early November.

Middle Tennessee Experiment Station (Spring Hill):

The temperature pattern throughout the growing season was similar to that at Highland Rim, with a cool period occurring from late July through August (Appendix Table A4).

The rainfall pattern at Spring Hill was quite different than Springfield, however, with very large amounts of rainfall falling in late October and late

November. Also, rainfall amounts were above normal for June and the first half of July, with a positive effect on crops.

West Tennessee Experiment Station (Jackson):

Other than a cool period from late July to late August, temperatures in Jackson were fairly close to or just slightly above normal (Appendix Table A5). A very large amount of rainfall fell in late April, having some negative effects on planting operations in low lying fields. The rainfall from June through September was below normal, with the exception of a rainy period in late August. The below average rainfall during July and early August represented a short moisture stress period for crops. Rainfall was greatly above normal in October and November.

Milan Experiment Station:

The most remarkable trend at Milan is the greater than normal minimum temperatures throughout the season. The weather station was moved about 10 years ago, and part of the climate normals was developed from daily data collected at the previous location. I suspect this is the cause of the difference in temperatures, more so than an actual trend since it was not seen in nearby Jackson.

Rainfall patterns were remarkably similar to Jackson, although the moisture deficit in July, early August and September was more severe. Fortunately, there were beneficial rains the latter half of August which helped to minimize the negative effects on crops.

Ames Plantation:

Ames experienced a warmer than normal late April through mid-June and a cooling period in August as did the other sites. There was also a warming period in October and November, also seen at most other sites.

Rainfall was below normal in March, but then the rainfall was above normal for most of the growing season. The cooler than normal temperatures from late June through August and the above normal moisture provided excellent growing conditions for crops at Ames Plantation.

Appendix A

Semi-monthly charts of Temperatures and Precipitation

Knoxville Experiment Station

Plateau Experiment Station

Highland Rim Experiment Station

Middle Tennessee Experiment Station

West Tennessee Experiment Station

Milan Experiment Station

Ames Plantation

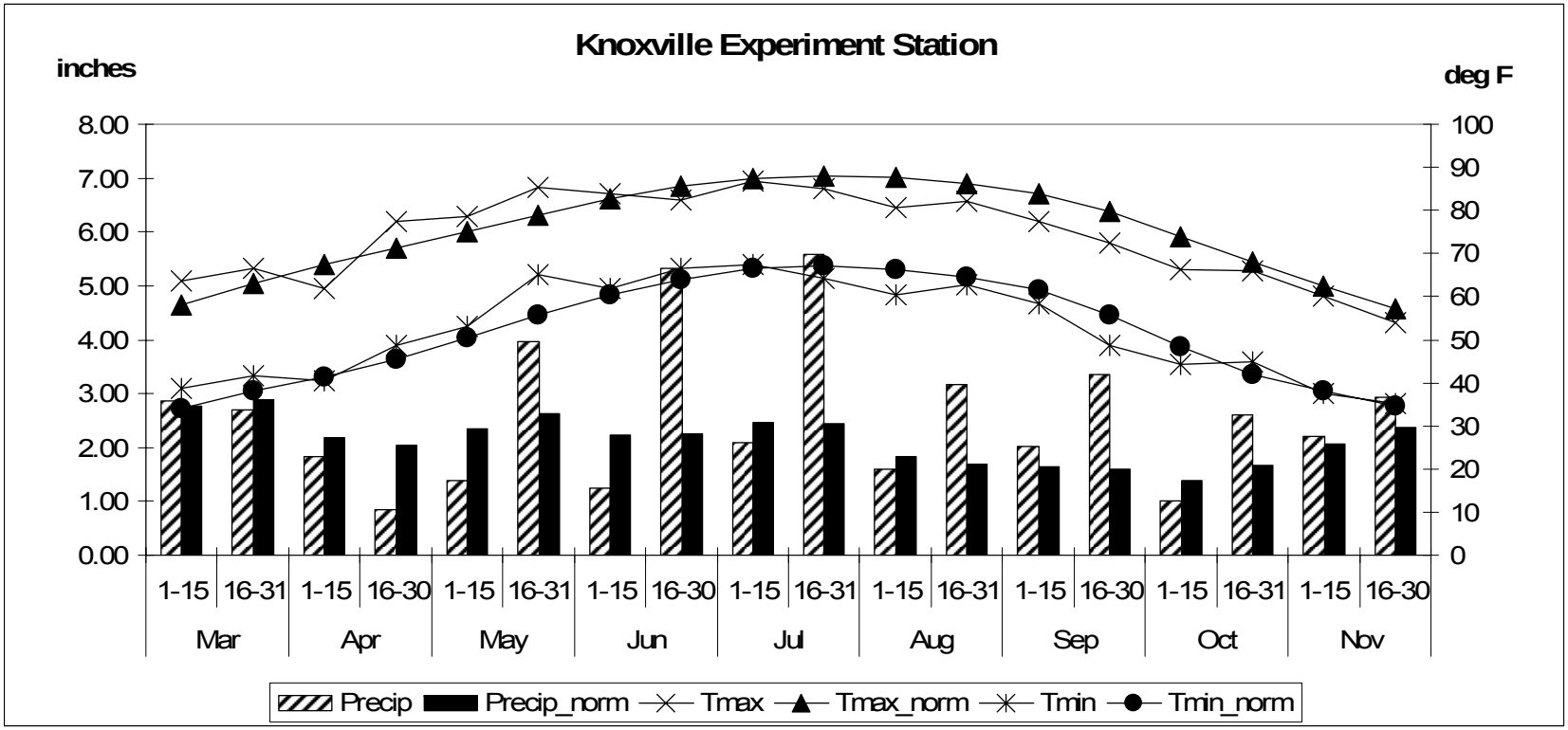


Table A1. Comparisons of 2005 temperature and precipitation with climate normals (1971-2000) for Knoxville Experiment Station.

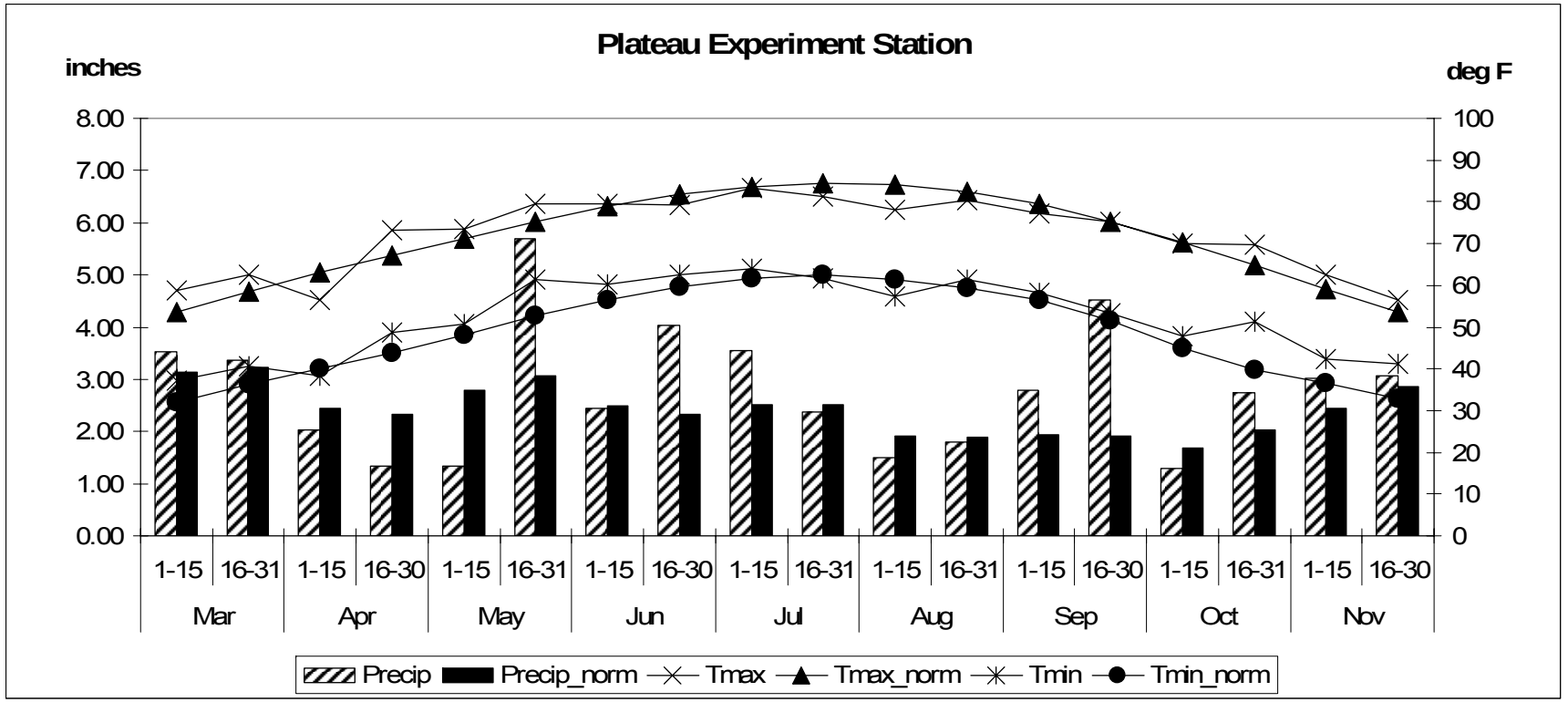


Table A2. Comparisons of 2005 temperature and precipitation with climate normals (1971-2000) for Plateau Experiment Station.

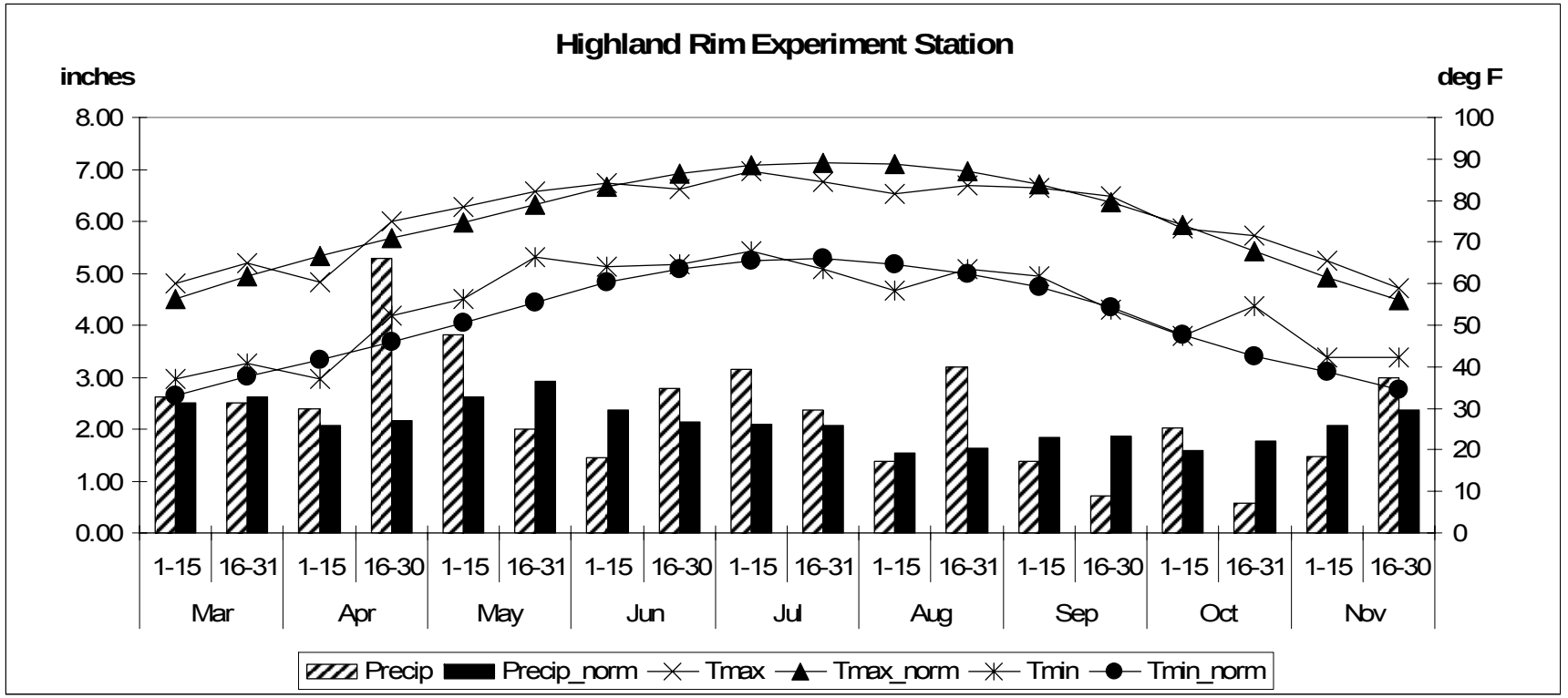


Table A3. Comparisons of 2005 temperature and precipitation with climate normals (1971-2000) for Highland Rim Experiment Station.

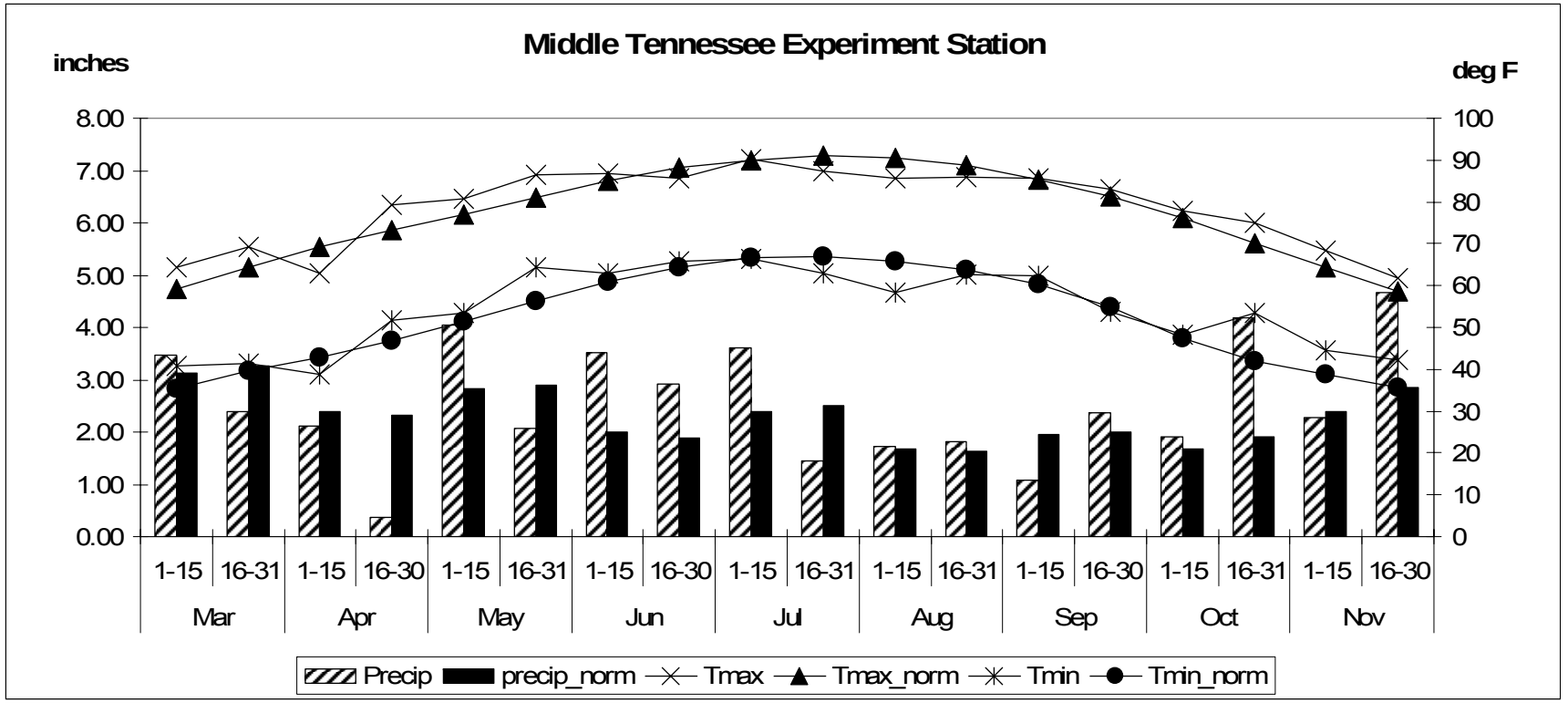


Table A4. Comparisons of 2005 temperature and precipitation with climate normals (1971-2000) for Middle Tennessee Experiment Station.

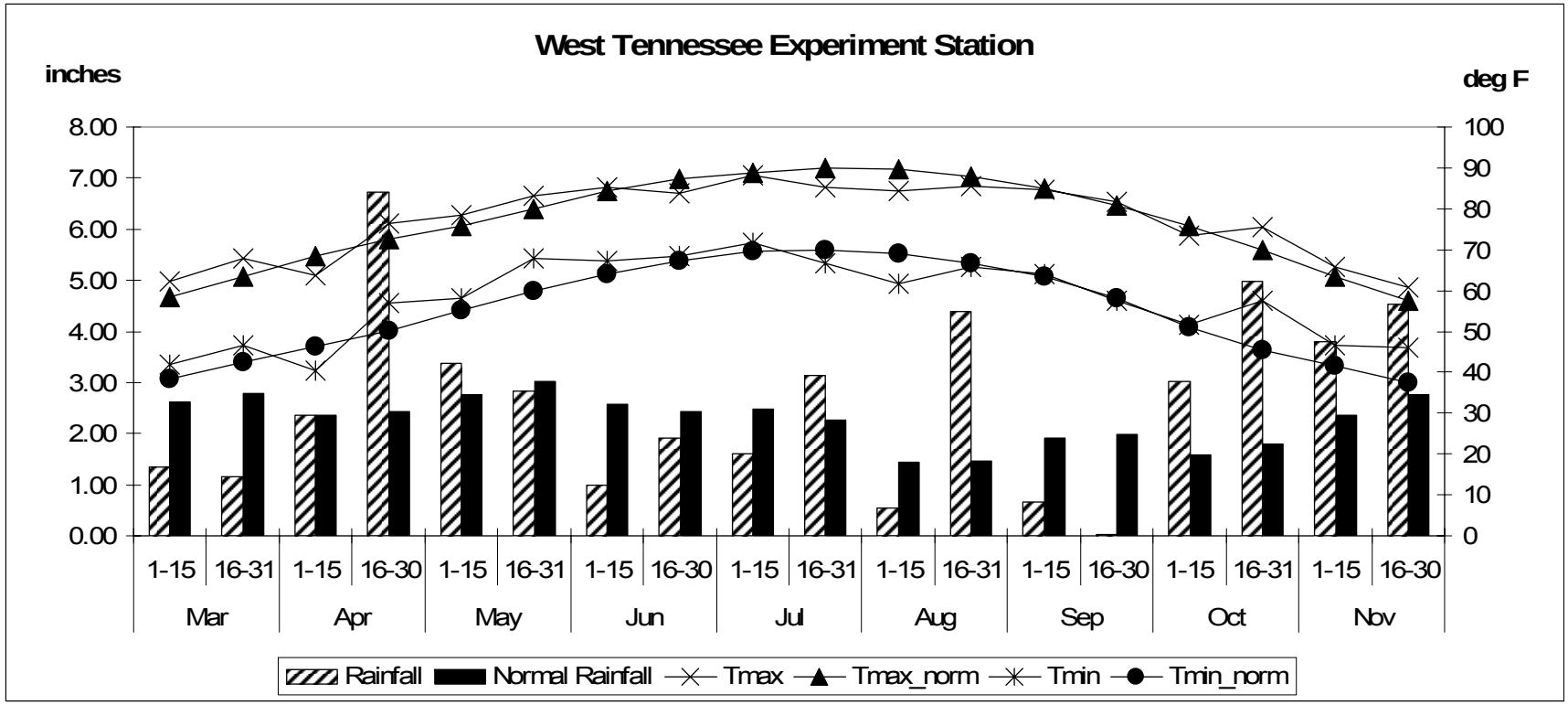


Table A5. Comparisons of 2005 temperature and precipitation with climate normals (1971-2000) for West Tennessee Experiment Station.

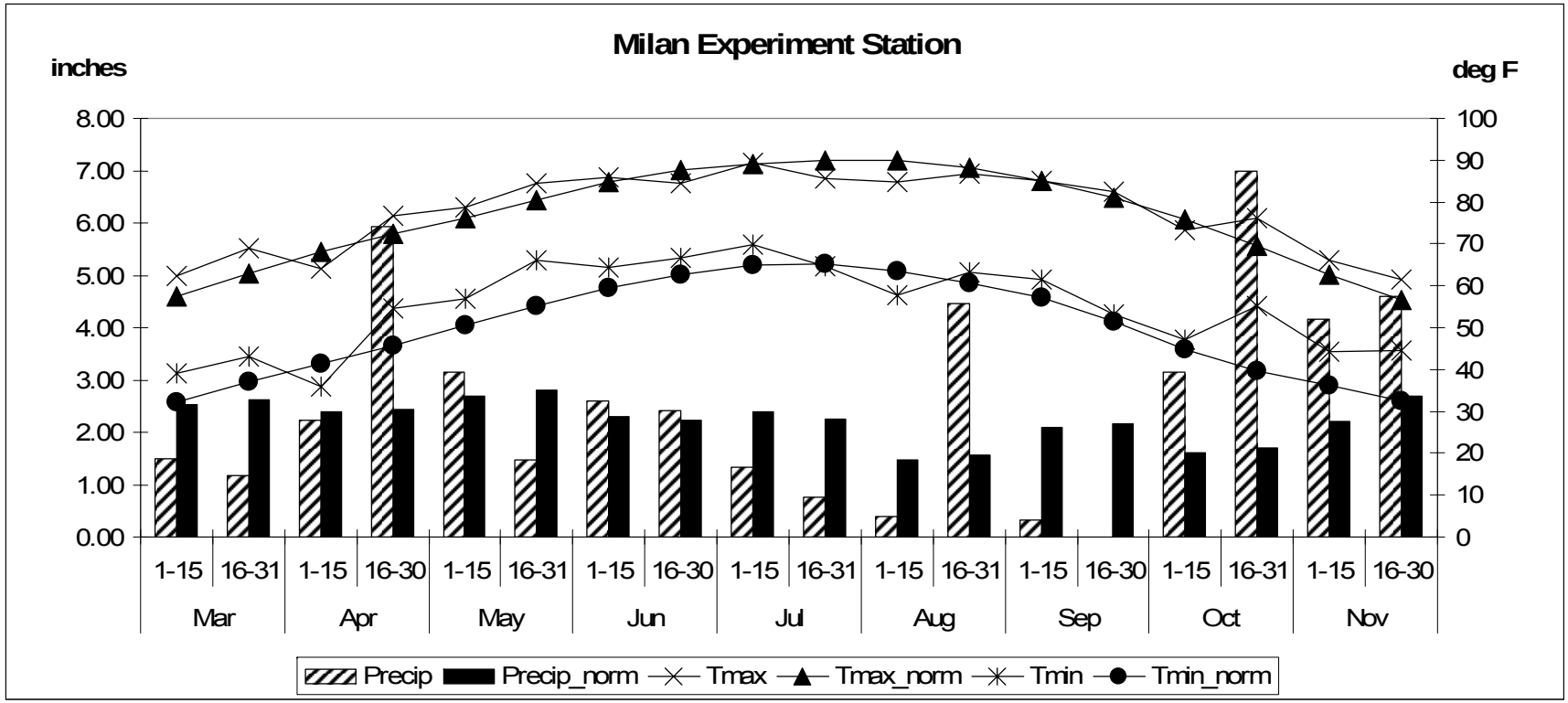


Table A6. Comparisons of 2005 temperature and precipitation with climate normals (1971-2000) for Milan Experiment Station

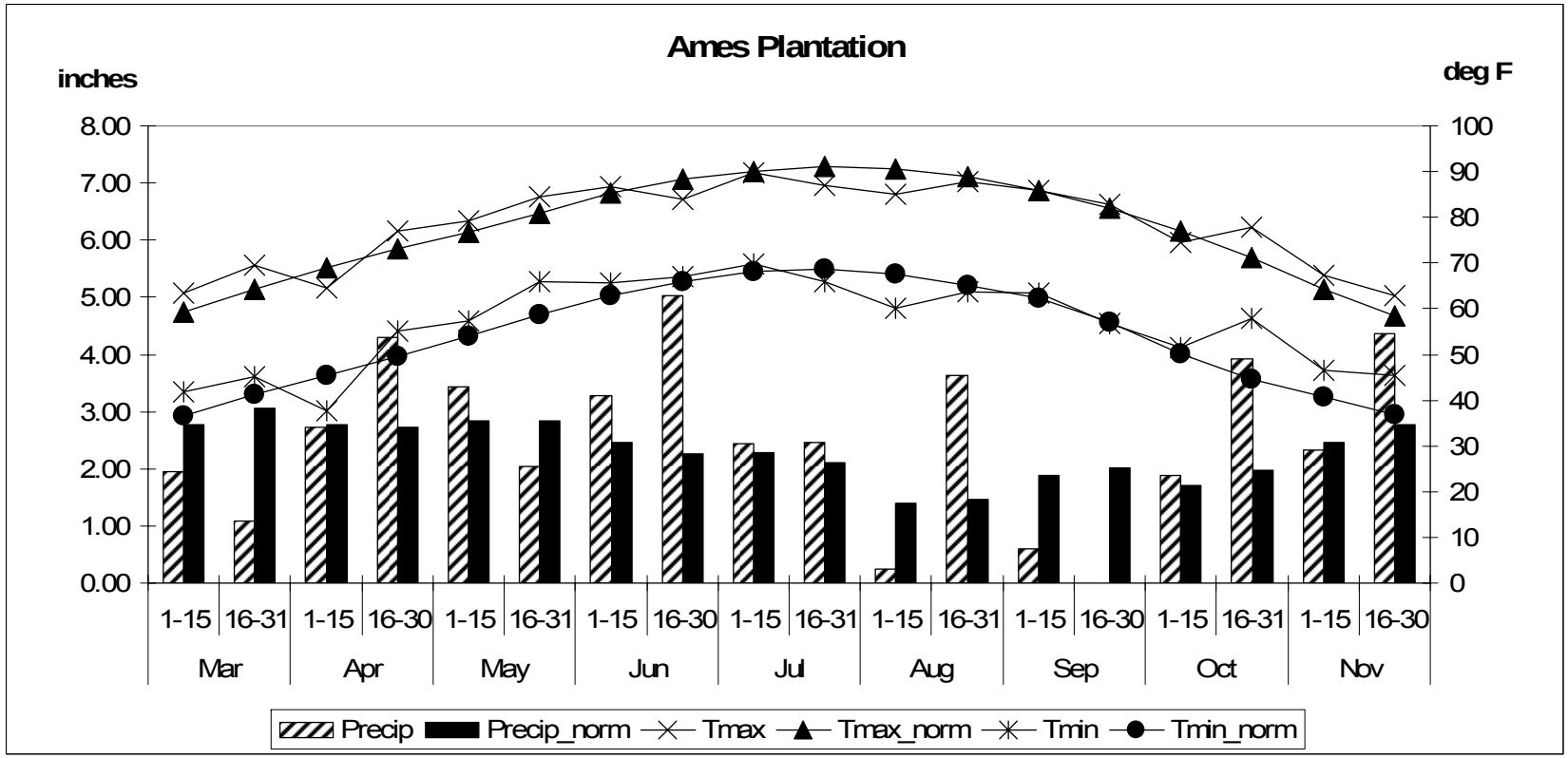


Table A7. Comparisons of 2005 temperature and precipitation with climate normals (1971-2000) for Ames Plantation.