SPRING WEATHER CONDITIONS: PINAL CO.

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Spring weather once again presented challenges to growers trying to establish an early and healthy stand of cotton. Pre-season optimism that warm, dry winter weather would continue through the spring months was quickly dashed in late March when the jet stream moved over Arizona and then continued to wobble back and forth over the state for much of the next five weeks. The jet carried a number of strong storms that generated rains, cool temperatures and very windy weather.

Most growers would agree 1998 and 1999 have been among the more difficult planting seasons in recent years. A review of AZMET spring weather records would support this point of view. To assess the current and past planting seasons, we examined five weather statistics that impact the planting season (March & April): 1) heat unit accumulation, 2) day-to-day temperature variability, 3) total precipitation, 4) number of days with precipitation, and 5) days with extreme winds. We then ranked each year from 1 to 13 with 1 being the best spring between 1987 and 1999 and 13 being the worst. Best conditions consisted of the highest heat unit accumulation, lowest level of temperature variability, lowest amount of precipitation, fewest days with precipitation, and fewest days with high wind speeds. Worst conditions were the exact opposite of best: lowest heat unit accumulation, highest temperature variability, highest total rainfall, highest number of days with precipitation, and the most days with high wind speeds.

The results of this spring weather comparison are presented in Table 1 for Maricopa. Ranks for each weather statistic are provided in parentheses and the final column presents the average rank of the five weather statistics for each year. A review of Table 1 reveals three planting seasons that could be classified as good to excellent: 1989, 1996 and 1997. Our system also rated the spring of 1993 as good because the analysis covered only the months of March and April. Wet fields and flooding caused by heavy winter precipitation made for a difficult 1993 planting season in many locations.

Four planting seasons could easily be classified as poor: 1988, 1991, 1998, and 1999. All four of these spring seasons presented growers with cool and variable temperature conditions, a number of high wind days, and above normal precipitation. The spring of 1992 was also quite difficult due to an extreme amount of wet weather. Our analysis indicates the spring of 1999 ranks as the third worst weather spring since 1987 and avoided being designated the worst spring only because total precipitation and the number of days with precipitation were lower than the two lower rated springs -- 1991 and 1998. Other negative attributes of the spring of 1999 that are notable include very high day-to-day temperature variability (highest since 1987) and a number of high wind days.

While 1999 spring weather was certainly less than desirable, a poor spring does not necessarily translate into a poor yielding year. A review of Pinal County cotton yields over the past 12 years suggests little relationship between spring weather and final yields. For example, yields in years with the four worst weather springs averaged just 49 lb. lint/acre less than yields obtained during the four best springs. The take home message here is crop management, pest pressures, and weather conditions after the planting season play a critical role in determining final crop yields. Silvertooth recently reviewed important management and crop monitoring principles that can help the 1999 crop recover from the tough spring weather and take advantage of the prime production months of May, June and July (AZ Cotton Comments, May 15, 1999).

From the meteorological perspective, the next major hurdle for the 1999 crop will be the timing and intensity of the monsoon. A delayed and/or weak monsoon would certainly prove beneficial to the late 1999 crop. On average, the monsoon arrives in central Arizona about the 7th of July. A 10-day delay in the arrival of the monsoon would

add 300 heat units to the prime production season at a critical time for many fields -- peak bloom. A quick glance at Table 1 also reveals that an additional 300 HUs during prime weather conditions could help compensate for the late spring; HU accumulation in cold springs typically runs about 250-300 HUs below levels observed in springs with optimal planting weather.

Table 1. Heat unit accumulation, temperature variability, total precipitation, number of days with precipitation, and days with high winds for the period 1 March through 30 April at Maricopa for the period 1987-1999. Ranks of 1 to 13 are assigned to each weather statistic with 1 being the best (bold type) and 13 the worst (italics). Ranks are averaged when weather statistics from two or more years are equal. The average rank for the five weather statistics is presented in the last column.

YEAR	Heat Unit Accumulation	Temperature Variability*	Total Precipitation	Days With Precipitation	Days With High Winds**	Average Rank
1987	674 (8)	3.52 F (7)	**0.04" (1)**	**1 (1)**	*6 (13)*	6.0
1988	604 (9)	3.85 F (10)	1.18" (8)	8 (12)	3 (9)	9.6
1989	**831 (1)**	3.45 F (6)	1.30" (10)	2 (2.5)	1 (3.5)	4.6
1990	683 (6)	3.57 F (8)	0.35" (4)	4 (5.5)	3 (9)	6.5
1991	486 (12)	4.04 F (12)	1.93" (12)	7 (10.5)	4 (11)	*11.5*
1992	678 (7)	**2.37 F (1)**	*2.99" (13)*	*12 (13)*	1 (3.5)	7.5
1993	704 (3)	2.84 F (3)	0.83" (6)	4 (5.5)	**0 (1)**	3.7
1994	703 (4)	2.78 F (9)	1.22" (9)	5 (7.5)	1 (3.5)	6.6
1995	603 (10)	3.73 F (2)	0.59" (5)	6 (9)	2 (6.5)	6.5
1996	686 (5)	2.78 F (5)	0.28" (2)	3 (4)	1 (3.5)	3.9
1997	754 (2)	3.37 F (4)	0.31" (3)	2 (2.5)	2 (6.5)	**3.6**
1998	*482 (13)*	3.97 F (11)	1.34" (11)	7 (10.5)	3 (9)	10.9
1999	557 (11)	*4.88 F (13)*	1.02" (7)	5 (7.5)	5 (12)	10.1

* Average day-to-day change in mean air temperature for March and April.
** Number of days when mean wind speed exceeded 10 mph.