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FLOWER HABITS OF SELECTED STRIPPER AND PICKER COTTON VARIETIES AT LUBBOCK, TEXAS IN 2003

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Abstract

A shift from traditional stripper cotton varieties to Fibermax (FM) 958 and similar types has occurred in the Texas High Plains and Rolling Plains. A study to establish the flowering habits of FM 958 compared to several varieties known to represent a wide range of maturities was conducted in Lubbock, TX in 2003. Paymaster (PM) HS26, Paymaster (PM) 183, Acala 1517-99, Delta Pine (DP) 491, Fibermax (FM) 5013, and Fibermax (FM) X9740 were selected from the Bayer CropScience advanced yield test. All white blooms on Monday, Wednesday, and Friday during the bloom period were counted and recorded. All completely open bolls were counted and snap harvested on Monday, Wednesday, and Friday during the boll opening period. Each week the harvested cotton was pooled together for each variety. Each sample was ginned and a cumulative yield was calculated. The results of this study indicate that FM 958 is a determinate variety that produced more blooms and terminated blooming later than most conventional varieties for this area.

Introduction

In the last several years there has been a shift in the Texas High Plains and Rolling Plains areas from typical stripper varieties to FM 958 and similar types (USDA Cotton Varieties Planted 2000-2003). FM 958 has proven to be well adapted to this area and has become popular among cotton producers of the area. Our hypothesis is that FM 958 blooms later and produces more flowers during the blooming period. This study was established to compare the flowering habits of several varieties known to represent a wide range of maturities with FM 958.

Materials and Methods

Seven varieties selected from the Bayer CropScience advanced yield test at Lubbock in 2003 were evaluated: (PM HS26, PM 183, Acala 1517-99, DP 491,FM 958, FM 5013, and FM X9740). These varieties were selected because they are known to represent a wide range of maturities (Gannaway et al., 2002). A randomized complete block design was used with data being taken from the three replications of the test. Beginning on July 16th, all white blooms on Monday, Wednesday and Friday for each plot during the flowering period were counted and recorded. All completely opened bolls were counted and snap harvested initially on August 22nd continuing on Monday, Wednesday, and Friday until all bolls were harvested with the final harvest on November 7th. The three harvests for each variety from each week were combined. The samples were weighed after which the burrs were removed. The seed cotton samples were then ginned with lint and seed weights being recorded. Gin turnouts and lint percents were calculated from the data collected.

The test from which the data were collected was planted on May 9, 2003 and was furrow irrigated three times during the season. Heat unit accumulation from April 15th to September 20th was 106 percent of the long term average with the fall being unusually hot and dry. The Texas Agricultural Experiment Station at Lubbock maintains online resource for weather data (http://lubbock,tamu.edu/irrigate/et/weather/lubbock.txt). On October 14th, 24 oz of Finish® and 8 oz of Ginstar® were sprayed with the first freeze occurring on November 23rd. Bloom initiation was later than normal, possibly due to early June storms. Normal bloom initiation is near July 11th with a May 1st planting (Bowman et al., 2003).

Results and Discussion

PM 183 started blooming early and continued at a rapid rate through approximately August 20th with the final cumulative bloom number in a normal bloom period ending about August 20th being the lowest of all varieties (Fig. 1). DP 491 did not begin blooming during the first week of data collection and then reached peak bloom as PM 183 was reaching cutout. PM HS26, Acala 1517-99, FM 958, FM 5013 and FM X9740 followed an intermediate blooming pattern compared to PM 183 and DP 491. FM 958 and Acala 1517-99 started blooming at a slower pace, but accumulated more blooms than the other varieties in the period of August 6th thru August 22nd. Acala 1517-99 produced more total blooms than the other varieties. FM 5013 bloomed early and at a more rapid rate than PM HS26; however, the final bloom number was about the same for the two varieties. FM X9740 initiated flowering earlier and produced more flowers than the rest of the typical stripper varieties. FM 958 cut out about August 27th and did not bloom in any significant amount after that date, demonstrating the determinate growth habit of the variety. The other varieties had a late re-growth and bloom period. This re-growth period was so late in the season that these blooms did not mature to harvestable bolls.

A comparison of the cumulative number of early season and later season blooms produced by each of the varieties is shown in Figure 2. Accumulated blooms through July 30th are shown on the left side of the figure whereas the total blooms produced by August 20th (the latest date that a bloom is expected to produce a mature boll in the area based on a normal heat unit accumulation year) are shown on the right side of the figure. On July 30th, PM 183, the early maturing variety, and DP 491 the late maturing variety, are the only varieties with significantly different cumulative bloom numbers. By the end of the normal bloom period Acala 1517-99 and FM 958 had produced the most blooms. FM X9740 and FM 5013 produced significantly more blooms than DP 491 and PM HS 26. The blooms FM 5013 produced by August 20th was not significantly different from PM 183. PM 183 and PM HS 26 blooms were not significantly different. At August 20th, DP 491 cumulative bloom number was significantly less than any of the other varieties.

The number of open bolls showed a similar trend as number of blooms (Fig.3). One of the most notable differences is that FM 958 produced more bolls than Acala 1517-99 even though Acala 1517-99 produced more flowers. This suggests a higher retention rate for FM 958. PM 183 had 93 percent of its bolls opened by October 15th. DP 491 only had about 55 percent of its total bolls open at the same date. FM 5013 appeared to be slightly earlier in opening bolls than PM HS 26 with the number of final open bolls being about the same. DP 491 was able to take advantage of the long growing season experienced in 2003 and produced more total bolls by final harvest. FM X9740 was earlier than the other varieties except for PM 183 and opened more bolls than the other typical stripper varieties.

Lint yield per acre by week also showed similar trends as the blooms and open bolls (Fig. 4), however gin turnout resulted in a difference in cumulative yield rank. FM X9740 and FM 958 had the highest cumulative yield with FM X9740 being earlier than FM 958 in this data set. Acala 1517-99 was the third highest yielding variety, the same rank as it had in cumulative open bolls. DP 491 ranked 4th in the final lint yield although it had the most cumulative open bolls. This may be due to a lower lint percent in the late set bolls.

Summary and Conclusions

Flowering habits of seven cotton varieties that varied widely in maturity were studied at Lubbock, Texas in 2003. The numbers of blooms produced early and later in the season were significantly different among the varieties with Acala 1517-99 and FM 958 producing the highest number of blooms during a normal bloom period. FM 958 retained more blooms than Acala 1577-99 with FM 958 sharing the highest cumulative lint yield with FM X9740. PM 183 is truly a unique variety that blooms extremely early and reaches maturity very early but does not have as high cumulative lint yield as some of the later maturing varieties. The data on PM 183 indicated a higher retention rate than PM HS 26 and FM 5013 during a normal bloom period. DP 491 appeared to be a very late variety; however, with a longer season it may have the potential for higher yield by blooming at a very rapid rate and retaining much of its fruit. FM 5013 and PM HS 26 bloomed and yielded at an intermediate rate then reached cut out earlier. This may have been because the irrigation was managed for the longer season varieties. Finally FM X9740 bloomed and opened bolls earlier than PM HS 26, Acala 1517-99, DP 491, FM 5013, and FM 958 and was in the intermediate range in both cumulative blooms and cumulative bolls set but cumulative lint yield was higher than the other varieties, being approximately equal to FM 958. This is largely due to its higher lint percent.

This study indicated that FM 958 acted as a determinate variety on the Texas High Plains but produced more blooms and terminated blooming later than most specifically adapted varieties from the area. This determinate characteristic may allow FM 958 to partition carbohydrate to maturing bolls increasing fiber quality versus vegetative growth and flowering. The yield performance of FM 958 is due in part to this fruiting habit and high lint percentage. These characteristics along with its superior fiber properties and good storm resistance appear to be the primary reasons for its rapid adoption by Texas High Plains farmers.

References

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Acknowledgements

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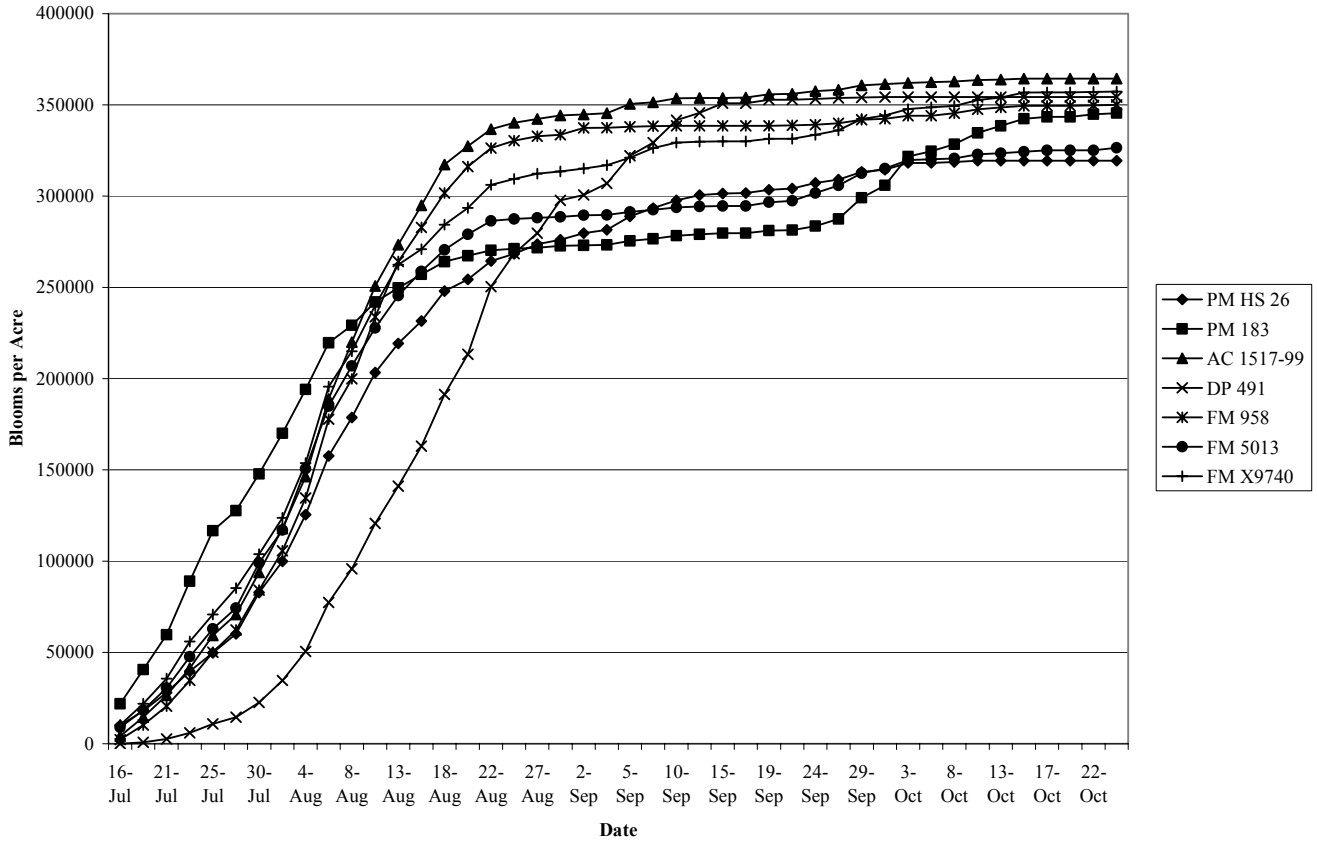

Figure 1. The cumulative number of blooms produced by several cotton varieties in 2003 at Lubbock, Texas.

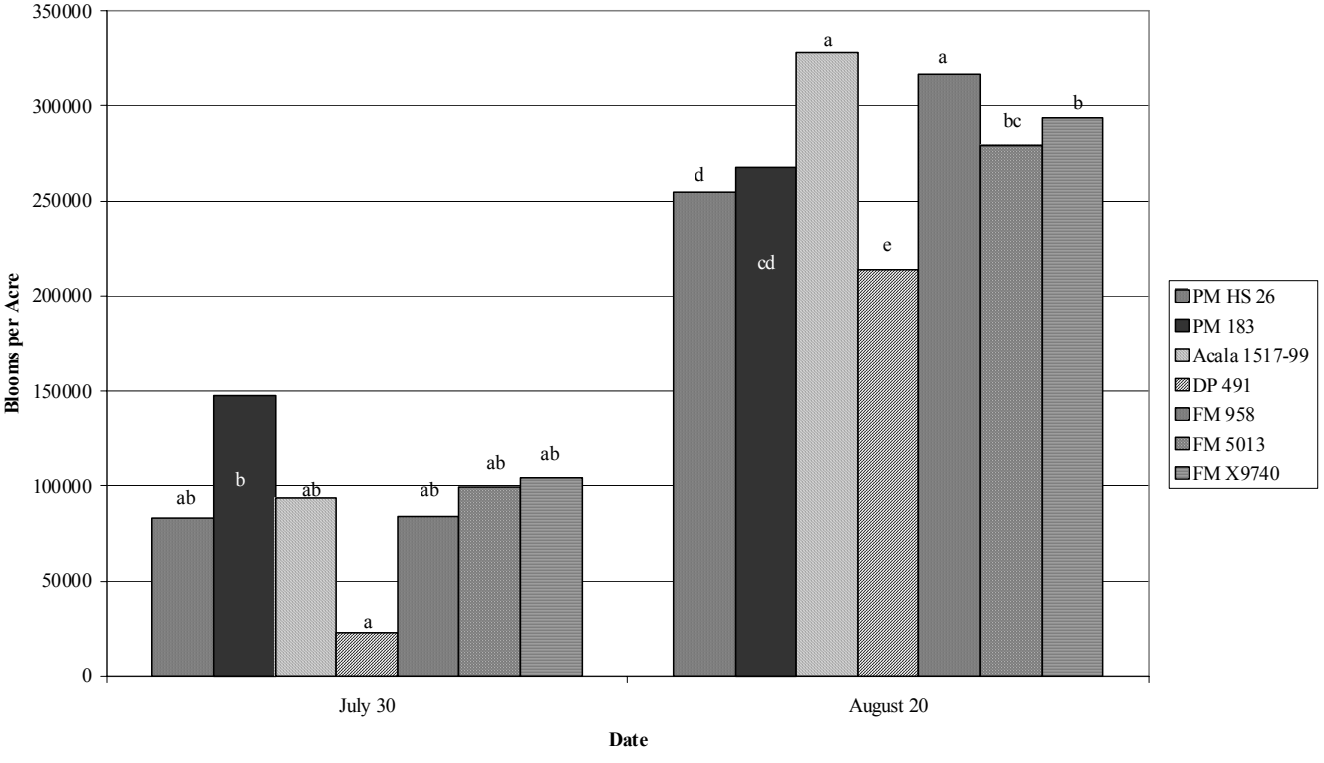

Figure 2. The cumulative number of blooms produced by several cotton varieties at two dates in 2003 at Lubbock, Texas. Bars with the same letter are not significantly different at $P \leq 0.05$.

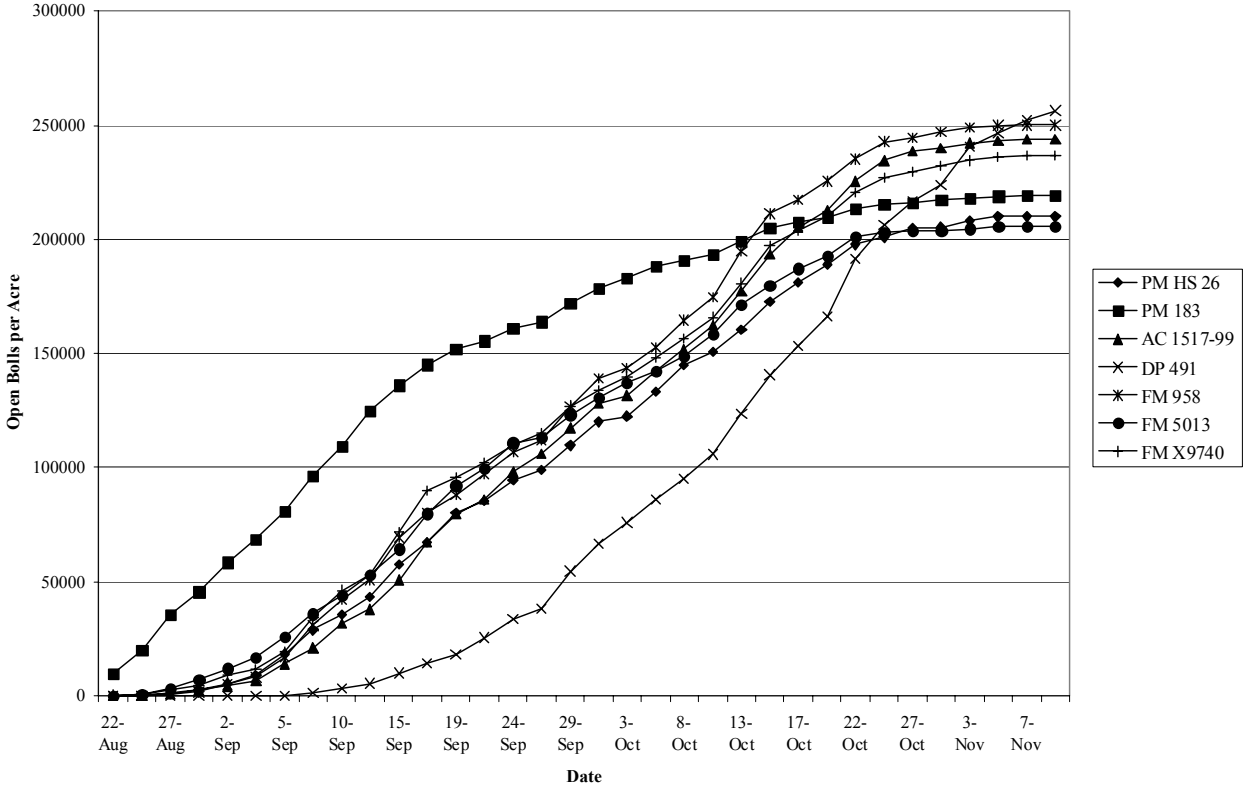

Figure 3. The cumulative number of open bolls per acre produced by several cotton varieties during 2003 at Lubbock, Texas.

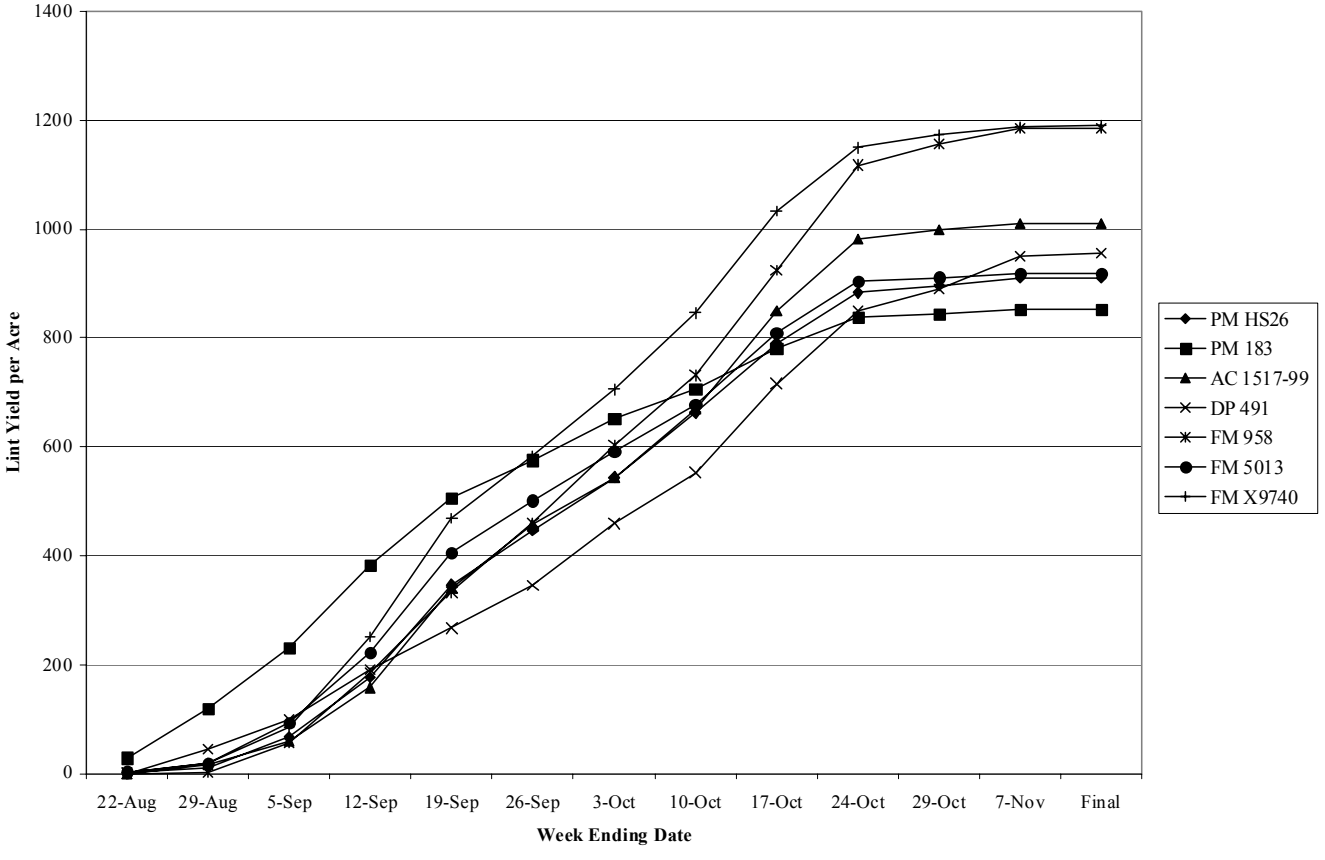

Figure 4. The cumulative lint yield per acre per week produced by several cotton varieties in 2003 at Lubbock, Texas.