

**TEXAS COASTAL PLAINS COTTON, MOTES  
AND FIBER QUALITY II. EFFECTS OF PIX  
(MEPIQUAT CHLORIDE)**

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**Abstract**

Motes are ovules or seeds that abort prematurely. Ovules or seeds may abort because of nutritional imbalances caused by physiological or environmental stresses. An experiment was conducted in Corpus Christi, Texas with the objective of studying the effects of irrigation, date of anthesis and pre-bloom applications of Pix (mepiquat chloride) on the incident of short and long fiber motes in cotton bolls. Irrigation significantly reduced the percent of motes during both years of the study. Pix applications consistently reduced the percent long fiber motes. This effect was more evident under rainfed than under irrigated conditions. Analysis of the data showed that the main effect of Pix or the interaction term of Water\*Pix were statistically significant in reducing either short or long fiber motes during two bloom tagging dates in 1994 and during one tagging date in 1995. However, a consistent numerical reductions in the number of motes was observed in Pix treated plots at most bloom tagging dates. Pix may prevent ovule or seed abortion by changing the partitioning of assimilates from vegetative to reproductive structures, ameliorating in this manner nutritional imbalances.

**Introduction**

Motes are ovules or seeds that abort prematurely, developing instead into structures with immature fibers attached to their surfaces. The weight of these structures and the length of their fibers depend on the time from anthesis when the development of the seed was terminated. Ovules or seeds may abort because of nutritional imbalances caused by physiological or environmental stresses. Weather fluctuations occurring in rainfed cotton producing areas, such as the Coastal Plains Region of Texas, often result in seed and boll abortion. An excessive number of seed abortion can cause reductions in lint yield

and may affect the quality of the fiber for milling purposes (Davidonis et al. 1996).

**Materials and Methods**

Field plots located at the Texas A&M Agricultural Research and Extension Center were planted with cultivar DPL-50 under two water regimes; dryland and drip irrigated. In 1994, dryland plots received 3 oz. of Pix per acre while irrigated plots received 9 oz. in two applications, both made prior to bloom. In 1995, dryland plots received 6 oz. of Pix per acre while irrigated plots received 14 oz. also divided in two applications. First position white blooms were tagged weekly for a period of five weeks. Tagged bolls were harvested and mapped (number of seeds, number of short-fiber motes, number of long-fiber motes). Short-fiber motes were defined as those having fibers less than one-half the length of fiber on normal seeds. Long-fiber motes had fiber longer than one half the length of fiber on seeds and weighed less than 60 mg.

**Results and Discussion**

Irrigation significantly reduced the percent of motes during both years of the study. Pix applications consistently reduced the percent long fiber motes during 1994 and 1995 (Tables 1 and 2). The effect of Pix in reducing the number of long fiber motes was more evident under rainfed than under irrigated conditions. The benefits of Pix were also more evident in 1994 than in 1995. This observation can be attributed to the higher amounts of rainfall occurring during the boll filling period in 1995 as compared to 1994. Analysis of the data showed that the main effect of Pix and the interaction term of Water\*Pix were statistically significant in reducing either short or long fiber motes during two bloom tagging dates in 1994 (Table 3) and during one tagging date in 1995 (Table 4). However, consistent numerical reductions in the numbers of motes were observed in Pix treated plots at most tagging dates during both years. The statistical analysis displayed in Tables 3 and 4 clearly shows that water stress is a important factor contributing to the premature abortion of cotton seeds.

**Conclusions**

The effect of Pix in reducing seed abortion was more evident under dryland conditions than under irrigated conditions. Irrigation reduced the number of motes per boll, masking the effect of Pix. Pix seems to be more effective in reducing the incident of long fiber motes. Pix may prevent ovule or seed abortion by changing the partitioning of assimilates from vegetative to reproductive structures, ameliorating in this manner nutritional imbalances.

**References**

Davidonis, G.H., A. Johnson, J. Landivar, and O. Hinojosa. 1996. Influence of low-weight seeds and motes on the fiber properties of other cotton seeds. Field crops. Res. 48: 141-153.

Table 1. The effects of water regime, bloom date and Pix on the percent of short, long and total fiber motes. Corpus Christi, TX, 1994.

|                             | <u>Dryland</u>      |                    |                 |
|-----------------------------|---------------------|--------------------|-----------------|
|                             | % Short Fiber Motes | % Long Fiber Motes | % (Total) Motes |
| <b>Bloom date: 06/06/94</b> |                     |                    |                 |
| No Pix                      | 5.39                | 2.16               | 7.55            |
| Pix                         | 4.96                | 2.03               | 6.99            |
| LSD (p=0.05)                | 3.37                | 1.30               | 4.63            |
| <b>Bloom date: 06/13/94</b> |                     |                    |                 |
| No Pix                      | 6.43                | 7.57               | 14.00           |
| Pix                         | 7.39                | 6.15               | 13.54           |
| LSD (p=0.05)                | 11.62               | 7.84               | 9.24            |
| <b>Bloom date: 06/20/94</b> |                     |                    |                 |
| No Pix                      | 7.81                | 16.68              | 24.49           |
| Pix                         | 8.30                | 12.29              | 20.59           |
| LSD (p=0.05)                | 10.34               | 24.87              | 26.71           |
| <b>Bloom date: 06/27/94</b> |                     |                    |                 |
| No Pix                      | 27.99 a             | 10.72              | 38.71           |
| Pix                         | 13.12 b             | 2.75               | 15.87           |
| LSD (p=0.05)                | 12.66               | 11.78              | 13.75           |
|                             | <u>Irrigated</u>    |                    |                 |
|                             | % Short Fiber Motes | % Long Fiber Motes | % (Total) Motes |
| <b>Bloom date: 06/06/94</b> |                     |                    |                 |
| No Pix                      | 9.91                | 3.40               | 13.31           |
| Pix                         | 8.92                | 6.28               | 15.20           |
| LSD (p=0.05)                | 3.87                | 2.96               | 6.64            |
| <b>Bloom date: 06/13/94</b> |                     |                    |                 |
| No Pix                      | 8.57                | 0.45               | 9.02            |
| Pix                         | 9.93                | 1.59               | 11.52           |
| LSD (p=0.05)                | 3.33                | 2.09               | 4.52            |
| <b>Bloom date: 06/20/94</b> |                     |                    |                 |
| No Pix                      | 6.07                | 1.06               | 7.13            |
| Pix                         | 4.34                | 2.38               | 6.72            |
| LSD (p=0.05)                | 5.41                | 4.24               | 4.49            |
| <b>Bloom date: 06/27/94</b> |                     |                    |                 |
| No Pix                      | 4.10                | 3.91 a             | 8.01            |
| Pix                         | 4.76                | 1.30 b             | 6.06            |
| LSD (p=0.05)                | 1.89                | 1.79               | 2.35            |
| <b>Bloom date: 07/05/94</b> |                     |                    |                 |
| No Pix                      | 6.39                | 0.54               | 6.93            |
| Pix                         | 4.76                | 3.32               | 8.08            |
| LSD (p=0.05)                | 2.06                | 5.23               | 4.49            |

Table 2. The effects of water regime, bloom date and Pix on the percent of short, long and total fiber motes. Corpus Christi, TX, 1995.

|                             | <u>Dryland</u>      |                    |                 |
|-----------------------------|---------------------|--------------------|-----------------|
|                             | % Short Fiber Motes | % Long Fiber Motes | % (Total) Motes |
| <b>Bloom Date: 06/07/95</b> |                     |                    |                 |
| No Pix                      | 4.01                | 4.28               | 8.29            |
| Pix                         | 3.79                | 4.74               | 8.53            |
| LSD (p=0.05)                | 2.17                | 2.24               | 2.55            |
| <b>Bloom Date: 06/14/94</b> |                     |                    |                 |
| No Pix                      | 5.04                | 8.50               | 13.54           |
| Pix                         | 5.83                | 9.25               | 15.08           |
| LSD (p=0.05)                | 4.51                | 14.52              | 9.24            |
| <b>Bloom Date: 06/21/94</b> |                     |                    |                 |
| No Pix                      | 5.20                | 24.27              | 29.47           |
| Pix                         | 3.36                | 16.89              | 20.25           |
| LSD (p=0.05)                | 2.30                | 20.89              | 18.69           |
| <b>Bloom Date: 06/28/94</b> |                     |                    |                 |
| No Pix                      | 13.37               | 17.75              | 31.12           |
| Pix                         | 17.49               | 15.06              | 32.55           |
| LSD (p=0.05)                | 7.81                | 10.58              | 7.66            |
|                             | <u>Irrigated</u>    |                    |                 |
|                             | % Short Fiber Motes | % Long Fiber Motes | % (Total) Motes |
| <b>Bloom Date: 06/07/95</b> |                     |                    |                 |
| No Pix                      | 3.55                | 3.83               | 7.38            |
| Pix                         | 4.14                | 3.20               | 7.34            |
| LSD (p=0.05)                | 3.10                | 2.96               | 3.37            |
| <b>Bloom Date: 06/14/94</b> |                     |                    |                 |
| No Pix                      | 7.83                | 2.34               | 10.17           |
| Pix                         | 9.64                | 2.35               | 11.99           |
| LSD (p=0.05)                | 8.12                | 1.65               | 6.87            |
| <b>Bloom Date: 06/21/94</b> |                     |                    |                 |
| No Pix                      | 4.05                | 4.92               | 8.97            |
| Pix                         | 5.49                | 1.67               | 7.16            |
| LSD (p=0.05)                | 3.60                | 10.47              | 9.48            |
| <b>Bloom Date: 06/28/94</b> |                     |                    |                 |
| No Pix                      | 5.89                | 3.69               | 9.58            |
| Pix                         | 4.58                | 5.03               | 9.61            |
| LSD (p=0.05)                | 4.54                | 4.09               | 8.55            |

Table 3. Critical levels of significance (Prob. >F) for percent of short and long fiber motes and for total motes by date of bloom. Corpus Christi, TX, 1994.

|                             | Short Fiber Motes | Long Fiber Motes | Total Motes |
|-----------------------------|-------------------|------------------|-------------|
| <b>Bloom date: 06/06/94</b> |                   |                  |             |
| Water                       | 0.0015***         | 0.0030***        | 0.0002***   |
| Pix                         | 0.4760            | 0.0748*          | 0.5798      |
| Water*Pix                   | 0.7744            | 0.0549*          | 0.3222      |
| Reps                        | 0.3150            | 0.8647           | 0.7080      |
| <b>Bloom date: 06/13/94</b> |                   |                  |             |
| Water                       | 0.1794            | 0.0013***        | 0.0337**    |
| Pix                         | 0.4902            | 0.9144           | 0.4874      |
| Water*Pix                   | 0.9048            | 0.3375           | 0.3168      |
| Reps                        | 0.5635            | 0.0768           | 0.0625      |
| <b>Bloom date: 06/20/94</b> |                   |                  |             |
| Water                       | 0.1250            | 0.0099***        | 0.0057***   |
| Pix                         | 0.7223            | 0.7040           | 0.6301      |
| Water*Pix                   | 0.5260            | 0.4855           | 0.6974      |
| Reps                        | 0.8300            | 0.3314           | 0.5261      |
| <b>Bloom date: 06/27/94</b> |                   |                  |             |
| Water                       | 0.0001***         | 0.0650*          | 0.0001***   |
| Pix                         | 0.0083***         | 0.0226**         | 0.0008***   |
| Water*Pix                   | 0.0051***         | 0.1975           | 0.0026***   |
| Reps                        | 0.6730            | 0.2892           | 0.2531      |

\*Significant at 0.10  
 \*\* Significant at 0.05  
 \*\*\*Significant at 0.01

Table 4. Critical levels of significance (Prob. <F) for percent of short and long fiber notes and total notes by date of bloom, Corpus Christi, TX, 1995.

|                                    | <b>Short Fiber<br/>Notes</b> | <b>Long Fiber<br/>Notes</b> | <b>Total<br/>Notes</b> |
|------------------------------------|------------------------------|-----------------------------|------------------------|
| <b><i>Bloom date: 06/07/95</i></b> |                              |                             |                        |
| Water                              | 0.9139                       | 0.2984                      | 0.3197                 |
| Pix                                | 0.7358                       | 0.9248                      | 0.9283                 |
| Water*Pix                          | 0.4563                       | 0.5604                      | 0.8898                 |
| Reps                               | 0.9913                       | 0.7764                      | 0.8117                 |
| <b><i>Bloom date: 06/14/95</i></b> |                              |                             |                        |
| Water                              | 0.0297**                     | 0.0169**                    | 0.2744                 |
| Pix                                | 0.3377                       | 0.8686                      | 0.5603                 |
| Water*Pix                          | 0.6989                       | 0.8728                      | 0.9598                 |
| Reps                               | 0.2932                       | 0.1641                      | 0.5290                 |
| <b><i>Bloom date: 06/21/95</i></b> |                              |                             |                        |
| Water                              | 0.5364                       | 0.0060***                   | 0.0084***              |
| Pix                                | 0.8016                       | 0.3006                      | 0.2985                 |
| Water*Pix                          | 0.0617*                      | 0.6794                      | 0.4774                 |
| Reps                               | 0.5265                       | 0.3517                      | 0.3930                 |
| <b><i>Bloom date: 06/28/95</i></b> |                              |                             |                        |
| Water                              | 0.0115**                     | 0.0165**                    | 0.0005***              |
| Pix                                | 0.6746                       | 0.8227                      | 0.8675                 |
| Water*Pix                          | 0.4211                       | 0.6341                      | 0.8720                 |
| Reps                               | 0.2023                       | 0.0685                      | 0.1317                 |

\*Significant at 0.10

\*\*Significant at 0.05

\*\*\*Significant at 0.01