THE EFFECTS OF DIFFERENT PIX® FORMULATIONS ON COTTON ROOT GROWTH

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Introduction

Cotton (*Gossypium hirsutum* L.) is a perennial that continues to grow vegetatively during reproductive development. Under conditions of above optimum soil moisture and fertility, vegetative growth can be excessive, thereby delaying maturity and increasing the incidence of lodging. The excessive foliage creates an environment favorable for boll rot and insect infestations and can decrease picker harvest efficiency. In an attempt to limit excessive vegetative growth in cotton, several growth retardants have been tested over the past 25 years. One which has been investigated extensively is mepiquat chloride (N, N – dimethylpiperidinium). Currently, several formulations of mepiquat chloride are marketed and sold by BASF. They include Pix®(4.2% mepiquat chloride), Pix® Plus (4.2 % mepiquat chloride plus *Bacillus cereus*) , and Pix® Ultra (3.9% mepiquat chloride). Although there is little question that mepiquat chloride does result in a reduction in overall plant height and length of vegetative branches, yield enhancement tends to be inconsistent, especially in Louisiana.

It has been speculated that the inconsistency of yield enhancement following mepiquat chloride application may be due to it's effects on root growth. Decreased water and nutrient uptake as a result of reduced root growth could account for reduced yields under certain environmental conditions. Objectives of this study were to determine shoot and root response to applications of Pix®, Pix® Plus, and Pix® Ultra.

Materials and Methods

This study was conducted in a greenhouse located at the Louisiana Agricultural Experiment Station's Red River Research Station in Bossier City, Louisiana. Cotton (cv. Deltapine NuCOTN 33B) seeds were planted in 7-gallon pots arranged in a completely randomized design with 12 replicates per treatment on 28 January 2000. Water and nutrients were supplied daily as needed. Pix®, Pix® Plus, and Pix® Ultra were applied at 8 ounces per acre in 15 gallons of water at the pinhead square stage on 22 March 2000. Plants were harvested on 25 May 2000. Each plant was separated into root and shoot at the cotyledonary node. After carefully washing the rooting media from the root system, root length and fresh weight were obtained. Shoot height, number of nodes, and fresh weight were determined, then shoots and roots were placed in a drying oven for 48 h at 60°C to determine shoot and root dry weights.

Results and Discussion

The effects of the different Pix® formulations on several cotton growth parameters are presented in Figures 1 through 3. All Pix® formulations significantly reduced shoot height compared to the control (Figure 1). Although all Pix® formulations resulted in a slight reduction in tap root length, only the reduction caused by Pix® Plus was significant compared to the control (Figure 1). All Pix® formulations also significantly reduced shoot dry weights compared to the control (Figures 3). All Pix® formulations significantly reduced root dry weight (Figure 2). Pix® Ultra significantly reduced dry weight shoot/root ratio (Figure 3). All Pix® formulations significantly reduced the shoot height to node ratio (Figure 3).

Conclusions

The results of this study indicate that, while Pix® formulations reduce shoot growth as desired, they may also reduce root growth. This may explain why yield response using Pix® has been historically inconsistent. Under conditions where water and nutrients are limiting, decreased root growth would likely result in either no yield response, or yield reductions.

References

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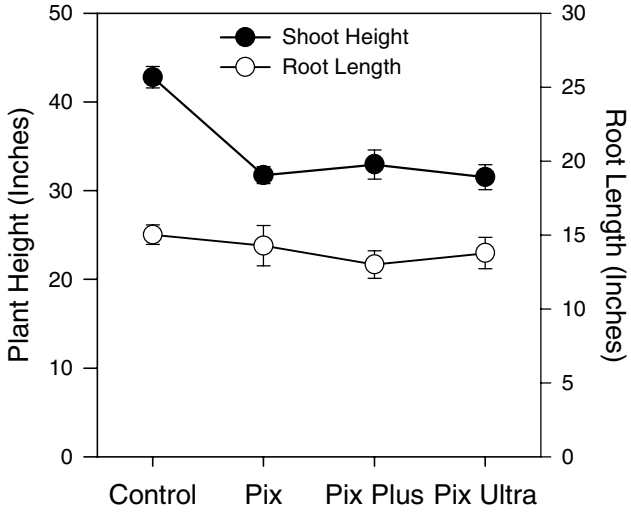

Figure 1. Effect of Pix® formulations on cotton shoot height and root length. Symbols represent the mean ± SE of twelve replications of each treatment variable.

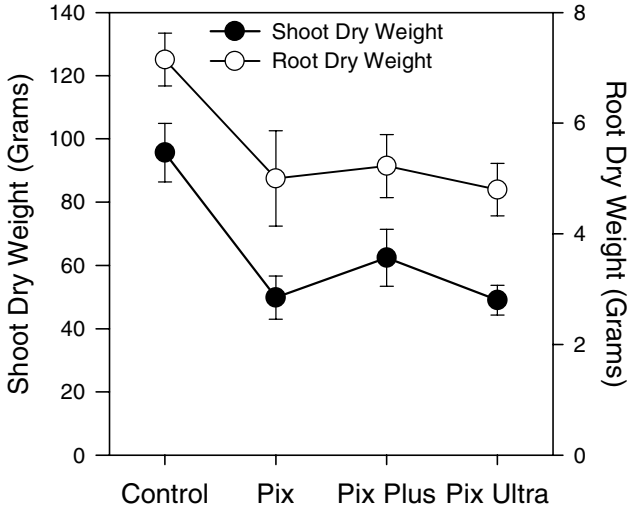

Figure 2. Effect of Pix® formulations on cotton shoot and root dry weight. Symbols represent the mean ± SE of twelve replications of each treatment variable.

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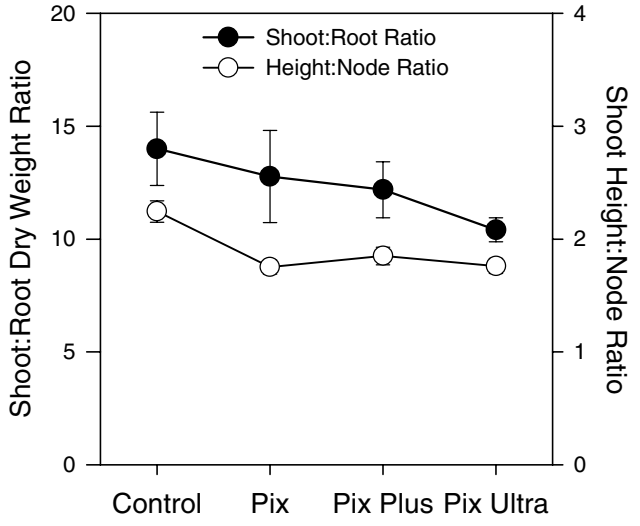

Figure 3. Effect of Pix® formulations on cotton shoot/root and height/node ratios. Symbols represent the mean ± SE of twelve replications of each treatment variable.