EFFECT OF PIX PLUS AND *BACILLUS CEREUS* ON THE PHYSIOLOGY AND YIELD OF COTTON

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Abstract

A four-year study in the field, growth room and laboratory was conducted to determine the agronomic and physiological responses of cotton to the new plant growth regulator Pix Plus. Treatments consisted of Mepiquat chloride (MC), Pix Plus (PP) and *Bacillus cereus (BC)* compared to an untreated control. Agronomic measurements included height, main-stem nodes, boll weight, boll number, yield and fiber quality. Physiological measurements included dry matter partitioning, photosynthesis and respiration, non-structural carbohydrate concentrations, chlorophyll content, photo-assimilate translocation, ATP, membrane leakage and mineral nutrient concentration. Additional measurements included amino acid profiles, polyols, glycine betaine and antibiotic effects.

There was no significant yield difference between Mepiquat chloride, Pix Plus and *Bacillus cereus*, although there was a trend for Pix Plus to yield slightly higher than Mepiquat chloride (+3.4%) or the control (+4.4%). Pix plus and *Bacillus cereus* had very similar effects on yield. Both Mepiquat chloride and Pix Plus caused higher boll retention in the canopy between main-stem nodes 5 to 11 and lower retention above main-stem nodes 15. There was no difference between treatments on fiber quality. Dry matter accumulation was significantly influenced with reproductive organs being favored.

When *Bacillus cereus* was sprayed on the leaf surface and then cultured on agar there was no more live bacteria after 8 hours. There was no difference between treatments in their effect on photosynthesis, respiration, stomatal conductance and transpiration. *Bacillus cereus* had little effect on amino acid profiles, except for a decrease in serine and glycine in BC-treated leaves which suggested an inhibition of photorespiration. There was no significant difference between nonstructural carbohydrates, except for the sugar alcohol myo-inisotol. There was also no significant difference in glycine betaine levels between *Bacillus cereus* and Pix Plus. there was some evidence of the production of antibiotics.

The bacterium seems to effectively influencing plant metabolism and growth resulting in improved carbohydrate partitioning to the reproductive structures. The mode of action appears to be via metabolites produced by the bacterium influencing the biochemistry of the leaf, particularly carbohydrate and sulfur metabolism, culminating in improved efficiency of translocation to the major sinks. The possibility of inhibited photorespiration and antibiotic effects exists. The end product is improved dry matter partitioning to the bolls.

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