
The Effect of AmiSorb, A Nutrient Absorption Enhancing Polymer, on Pepper Plant Nutrient Status and Yield 97-16Jim Fletcher, Robert C. Hochmuth, George Hochmuth¹**Abstract**

Polyaspartates, nutrient absorption enhancing polymers, when applied fertilizers are reported to enhance the availability of N, P, K, and other nutrients resulting in increased yields. This study was conducted to determine the effect of the polymer AmiSorb on pepper N and K sap nutrient status as well as pepper yield. Plant sap NO₃ and K concentrations were determined 34 and 61 days after seeding. Yields were determined for 4 harvests, June 2, 9, 19 and 26. There were no significant differences in sap NO₃ or K concentration levels or yields in the AmiSorb treatments versus the untreated plots.

Keywords: nutrient absorption enhancing polymers, polyaspartates, nutrient status

Introduction

Bell peppers in Florida were harvested on 20,300 acres in the 1995-96 season (Anon., 1997) with total costs of \$9,100 per acre for production and marketing (Smith and Taylor, 1996). New technologies have produced nutrient absorption enhancing polymers, polyaspartates. Polyaspartates were originally developed as water treatments for industrial applications. When these polymers are applied to fertilizer, they may enhance the availability of N, P, and K resulting in increase yields. These polymers are reported to artificially increase the area where the roots are located resulting in increased nutrient availability to plants (Anon., 1996). Past research has targeted agronomic crops such as corn, cotton, and soybeans. Research is needed to determine the effectiveness of AmiSorb in peppers grown with drip irrigation and polyethylene mulch.

Materials and Methods

Experiments were conducted at the Suwannee Valley Research and Education Center near Live Oak, FL on a Lakeland fine sand during the spring of 1997 to test pepper response to rates and methods of application of AmiSorb. Soil was prepared by

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plowing and rototilling. Total N of 180 lbs/A and K of 180 lbs/A were applied based on University of Florida recommendations (Hochmuth and Smajstrla, 1997). Preplant fertilizer 13-4-13 at the rate of 667 lbs/A was applied to all plots in a 24-inch wide band. Remaining N and K was injected at weekly intervals using ammonium nitrate and potassium nitrate as N and K sources. AmiSorb treatments were applied preplant incorporated (PPI) after fertilizer application and rototilled into soil with fertilizer. AmiSorb was mixed with water and applied via sprinkling can evenly to each plot. Untreated check plots received water only. Soil was bedded, pressed, and fumigated with methyl bromide: chloropicrin (98:2) at the rate of 400 lbs broadcast per acre. Final beds were 24 inches and across the top, 6 inches high, and were on 5 ft centers. Treatment plots requiring later injections of AmiSorb were treated via an injection of solution directly into drip tape. These injections were made by using CO₂ pressurized containers for each treatment. Injections were made on April 21 and May 23. At the April 21 injection, pepper flower buds were present but not open. On the May 23 injection, the pepper fruit was one-third mature size.

Plots 20 ft in length were planted with 'Camelot X3R' on March 28, 1997. Plants were placed in a double row on the bed with 12 inches between rows and 12 inches between plants. Experimental design was a randomized complete-block with six replicates.

Plants were irrigated by drip irrigation to maintain a tensiometer reading between 8 and 12 centibars at 12 inch depth in the bed. Pest control was by timely applications of labeled pesticides based on field scouting.

On two dates in the spring (34 and 61 days after transplanting), a sample of most recently matured leaves were harvested from each plot. Petioles were excised from leaves, chopped, and sap expressed. Fresh sap nitrate-N and K concentrations were determined by battery operated, hand held ion specific electrodes (Cardy ion meters Horiba, LTX, Kyoto, Japan). Peppers were harvested on June 2, 9, 19 and 26. Fruits were counted and weighed, and all data were subjected to analysis of variance and regression techniques.

Results and Discussion

Pepper Yield - Early marketable yields (first harvest) ranged from 426 to 488 bu/A with no significant difference among treatments (Table 1). Early fancy yields were in the 300 to 350 bu/A range again with no significance among treatments. Average total season yield for bell pepper in Florida is reported at 800 to 1000 bu/A in 1994-1996 (Anon, 1997). Total marketable yields in this study were 1200 to 1300 bu/A with no significant differences among treatments. Likewise, no differences were detected within pepper grade categories of Fancy, U.S. No. 1, U.S. No. 2, or cull. All average fruit weights were 0.3 lbs per fruit. This would indicate whatever effects AmiSorb may have on root

growth and/or root uptake of nutrients, the application of recommended fertilizer in drip-irrigated peppers (Hochmuth and Smajstria, 1997) was enough to ensure optimum yield in this study.

Pepper Petiole Sap Analysis - Petiole sap concentrations for nitrate-N for all treatments (Table 2) were above the critical levels of 1500 ppm prior to harvest and 800 ppm at the onset of harvest (Fletcher et al., 1993). No significant differences were detected among sap N levels on either sampling date.

Petiole sap concentrations for K for all treatments (Table 2) were above the critical levels of 3200 ppm prior to harvest and 2400 ppm at the onset of harvest (Hochmuth, 1994). No significant differences were detected among K levels on either sampling date.

AmiSorb rate and timing of application had no effect on plant petiole sap N and K or pepper yield. The last of response in this study may be due to the high nutrient availability of N and K in the weekly drip fertigated program.

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Table 1. The effect of AmiSorb on pepper yield in the spring, 1997 season at Live Oak, FL

Treatment	Total Rate (qts/A)	Method ^x of Application	Early Yield (bu/A) ^y		Total Yield (bu/A)					Avg. Fruit Wt. (lbs)
			Total Mkt	Fancy	Total Mkt	Fancy	No. 1	No. 2	Cull	
Untreated check	0	None	488.5	290.9	1264.3	697.5	483.8	83.0	75.5	0.3
AmiSorb	1	PPI	462.0	352.6	1269.5	732.7	472.4	64.3	69.0	0.3
AmiSorb	2	PPI	439.2	311.1	1316.1	743.6	505.1	67.4	81.4	0.3
AmiSorb	3	PPI	438.2	328.8	1224.3	712.5	463.1	48.7	79.9	0.3
AmiSorb	2	PPI and INJ	456.3	334.5	1283.5	730.7	505.6	47.2	77.8	0.3
AmiSorb	3	PPI and INJ	425.7	301.3	1282.9	717.7	513.9	51.3	67.4	0.3
Significance (p=0.05) ^z			NS	NS	NS	NS	NS	NS	NS	NS

^x Applications of AmiSorb were preplant incorporated (PPI) or injected into the drip irrigation (INJ). Where PPI and INJ were used, the total rate was divided evenly over three applications, 1 PPI and 2 INJ.

^y Early harvest was first harvest.

^z Treatment effects were not significant (NS) at the 5% probability level.

Table 2. The effect of AmiSorb on pepper plant sap N and K levels in the spring, 1997 season at Live Oak, FL.

Treatment	Total Rate (qts/A)	Method ^x of Application	Sap nitrate-N (ppm) ^y		Sap K (ppm)	
			1 May	28 May	1 May	28 May
Untreated check	0	None	2144	783	3950	3817
AmiSorb	1	PPI	2092	888	4100	3700
AmiSorb	2	PPI	2212	865	4083	3750
AmiSorb	3	PPI	2058	1005	3800	3733
AmiSorb	2	PPI and INJ	2231	805	3883	3617
AmiSorb	3	PPI and INJ	2227	933	3867	3600
Significance (p=0.05) ^z			NS	NS	NS	NS

^x Applications of AmiSorb were preplant incorporated (PPI) or injected into the drip irrigation (INJ). Where PPI and INJ were used, the total rate was divided evenly over three applications, 1 PPI and 2 INJ.

^y Stage of growth 1 May (prebloom) and 28 May (fruits one third full size).

^z Treatment effects were not significant (NS) at the 5% probability level.